

REVISION METHOD OF HUMAN LIFE VALUE AND NEEDS ANALYSIS

A thesis submitted for the degree of Doctor of Philosophy of
The Australian National University

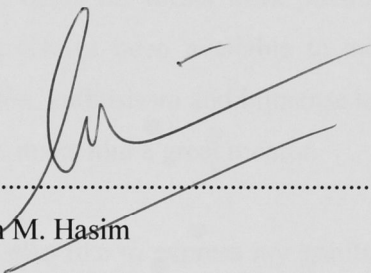
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Statement of Originality

I hereby declare that this submission is my own work. To the best of my knowledge and belief this thesis contains no material previously published or written by another person, except where due acknowledgement has made in the text of the thesis. This work has not been submitted previously, in whole or in part, to qualify for any other academic award.



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Date 6/2/2009

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Abstract

There are numerous methods to determine the amount of life insurance a person needs – it can be scientific or simplistic. The more scientific methods to determine the appropriate amount of life insurance are the needs analysis and the human life value. The most commonly used sales tool is the needs analysis; and the human life value is the most agreed academic expression for the purpose of life insurance. However, many life insurance agents and financial advisers simply rely on traditional rules of thumb. They can simply guess using a simple multiple of current income or turn to tools like life insurance or financial calculators. The fact is, they do not scientifically evaluate the life insurance cover needed and hence a professional basis has been lacking in life insurance selling. This is the reason why a person is frequently under or over-insured.

There are also weaknesses of using needs analysis and human life value as a life insurance selling tool. Therefore, this research combined these two methods, and with a few revisions, we developed a method of determining the amount of life insurance needs as a correct solution and hence provide adequate protection to relate the amount of life insurance a person need to carry to the real value of his or her income. A method that we name the 'Revision Method'.

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Chapter 1

Introduction

“How much life insurance does a person need?” This is a common question, but the answer can be quite complicated. This has been at the core of the dilemma of life insurance agents and financial advisers. They can merely guess using a simple multiple of current income or some of them turn to tools like life insurance or financial calculators that used scientific methods. The fact is, not all life insurance agents and financial advisers scientifically evaluate the life insurance cover needed for their clients and hence a professional basis has been lacking in life insurance selling. This is the reason why a person is frequently under or over-insured.

There are numerous methods to determine the amount of life insurance a person needs – it can be scientific or simplistic. The more scientific methods to determine the appropriate amount of life insurance are the needs analysis and the human life value. According to John E. Scarbrough and George A. Norris (1999), the most commonly used sales tool is the needs analysis; and the human life value is the most agreed academic expression for the purpose of life insurance.

However, many life insurance agents and financial advisers simply rely on traditional rules of thumb. A common rule is that a person should be insured for a minimum of six to ten times his annual earnings (Cordell, 2004). According to the theory, an older person would use the lower end of the range and a younger person should consider insurance coverage at the higher end since they typically have less savings, fewer investments and modest amounts in their retirement plans. Clearly, this method is very simple but misses a range of important factors such as household demographics, past savings, social security offsets and housing expenses. It also ignores expected life changes and individual preferences about sustaining the living standard of survivors (Steuer and Kotlikoff, 2001). In addition, different life insurance agents may suggest different multiples.

Needs analysis is the life insurance agent's most commonly used sales tool and has been used by most financial planning websites. Needs analysis is a process for measuring financial needs and developing solutions. It will utilise objective and subjective criteria to determine the amount of life insurance needs. These include immediate cash needs such as funeral and other final expenses, intermediate cash needs such as debt repayment and emergency fund as well as longer-term needs such as income for beneficiaries.

The other method that is associated with life insurance selling is based on the human life value concept. This concept is not limited to life insurance in its application and has been used in many other areas – an analysis of population to estimate the value of the nation, life insurance programs, judicial awards in accidental death and disability liability cases; assessment of public policies and projects; and key value of a man

(Trosper, 1960). Much of the concept of human life value in life insurance is derived from the writings of Dr. Solomon S. Huebner. In his book, *the Economics of Life Insurance* (1959), he discussed the human life value concept as the economic basis of life insurance, the monetary importance of human life values, the need for scientific treatment and methods for appraisal. Huebner capitalised a person's contribution to his family over the period to retirement age, or to the end of his life expectancy.

1.1 Inadequate Life Insurance Coverage

According to *Financial Impact of Premature Death: The Value of Adequate Life Insurance Coverage when Tragedy Strikes* (2003), a recent report commissioned by Metropolitan Life Insurance Company, New York based on one thousand respondents that had lost a spouse within a period of six months to five years prior to the survey; 39% of surviving families in the United States did not have any form of life insurance. Furthermore, those families that did have life insurance in place had an average coverage amount of only 2.1 times personal income. As a result, two-thirds of surviving spouses described this shortage of life insurance as having a devastating or major impact on their families' financial well-being. Even five years after the loss, 42% of surviving spouses surveyed said their financial situation is still worse than it was before their loss.

James O. Mitchel (2003) studied the adequacy of life insurance coverage in the United States. The study showed apparent inadequate life insurance coverage. The most under-insured group are those with the largest need – married parents and single parents. These groups have 20% or less of the needed coverage. Laurence J. Kotlikoff also

conducted much of this research. The most recent research by Kotlikoff and his colleague, Jagadeesh Gokhale (2002) revealed that under-insurance is prevalent. A significant fraction of secondary earners in married couple and the vast majority of whom are women; are significantly under-insured against the death of the breadwinner. Summarising their research, Kotlikoff and Gokhale said that the cost of insurance is not a factor of under-insurance because the life insurance industry is highly competitive and insurance premiums are generally quite reasonable. Insurance agents and financial advisors, and the unpleasantness of thinking carefully about a person's death are the likely factor of life insurance inadequacy.

In Australia, a research commissioned by AXA Australia and carried out by DEXX&R (Axa Insurance, 2005) has revealed that many Australians have less life insurance coverage that they need to protect their income and families. Life insurance cover of the average Australian is just 30% of that required equating to a massive 70% under-insured¹.

Other alarming research conducted by Rice Walker Actuaries in 2005 on behalf of the Investment and Financial Services Association (2005) found that a staggering 60% of insured families in Australia have not got enough life insurance to look after their dependants for more than a year if they were to die. The research also showed that only 4% of Australian families with dependent children have an adequate level of life insurance cover.

¹ *Most Australians are still significantly under-insured* in AXA News Release on 20th July 2005.

Malaysia had a population of 22 million in 1999 but only 27% of them are insured (Life Insurance Association of Malaysia, 1999a).

1.2 Problem descriptions

Firstly, by using needs analysis as a sales tool, the recommendation amount of life insurance would leave a person over or under-insured. Similar goes to the human life value method. However, both methods can be improved with a few revisions. The post-death needs under the needs analysis must be revised to incorporate the reality that the family's standard of living changes over time. The projection of a changing standard of living is a part of human life value analysis.

The research will look into both methods and combine both concept of needs analysis and human life value to create a powerful methodology that provide adequate life insurance protection.

Secondly, most conventional methods involve fact-finding that requires an immense amount of customer's personal information and details, and their financial targets in the future. Customers may not like to disclose too much of their personal and financial details to life insurance agents or financial advisers in seeking advise and may consider the information to be private and confidential.

Therefore, this research also will try to minimise the number of questions required in the computations.

1.3 Significance of the Study

This thesis contributes to a development of a scientific method as a correct solution to replace the conventional methods in selling life insurance products and hence provide adequate amount of life insurance a person need to purchase.

First, the primary audience for the results of this research are life insurance agents and financial advisers who are responsible to recommend the appropriate amount of life insurance needed by their clients. This research presents a new scientific method as a sales tool to replace the conventional methods in selling life insurance products.

The second audience for these results are the underwriters of life insurance companies. The insurance company is interested in the correct amount of life insurance so that it may be able to reject applications for amounts that represent over-insurance. Therefore, in applying this method to company underwriting of life insurance, it can be used as a guide in determining the right amount of life insurance to purchase.

Finally, this research describes the methodology used in determining how much life insurance should be purchased on an individual life. It is the amount that the individual's family is at risk of losing in future income in the event of his death. The family will suffer loss of income that they used to receive during the breadwinner's lifetime. Researchers who are interested in conducting a research on the judicial award to compensate the victim's dependents in wrongful death litigation might be interested in using this method.

1.4 Methodology

A case study method was selected for this research. We chose Malaysia as a case study for the application of the revision method.

Firstly, we developed a family life-cycle model for Malaysia's three major races – Malays, Chinese and Indians.

Four major areas are emphasised in this model:

1. The person's total annual income over the remaining years of his working lifetime as well as his retirement benefits.
2. The income tax for the person is calculated using the existing tax tables and rules produced by the Inland Revenue Department in Malaysia.
3. The household expenditures of the person and his family member are calculated using the data published by the Department of Statistics, Malaysia. Any capital needed immediately upon the death of the breadwinner is identified.
4. Analysis of income, tax and expenses after death of the breadwinner.

Lastly, in the application of the revision method, we determined the present value of net future income of an individual to the family. The revision method is then used to determine the amount of life insurance coverage necessary to maintain the family's standard of living in terms of multiple of income.

1.5 The Scope and Limits of the Study

Malaysians are racially diverse with vastly different cultural and economic backgrounds. The family life-cycle model, income structure and expenditure pattern differs significantly by race. The phenomena arose from the different impacts of the history of each race in Malaysia as well as the government's policy.

The model developed in this research and results on the amount of life insurance recommendations as a multiple of current income can only apply to the three major races in Malaysia namely Malays, Chinese and Indians. However, the methodology can be used in any other country.

1.6 Chapter Outline

Chapter 2 is a review of the relevant research literature on the areas of human life value and needs analysis as well as the current life insurance selling practise with emphasis on Malaysian scenario. Chapter 3 describes the research design, methodology, data sources and identify where limitations would apply. Chapter 4 provides an overview of the Malaysian demographic and the development of the family life cycles model. The first section in chapter 5 presents the estimation of individual's total income for each year from projections of his current salary and retirement benefits. The second section formulates the analysis of income taxes for individual using the existing tax tables and rules. Chapter 6 formulates a projection of the cost of a human life as a monetary expression based on household expenditures, cost of children's education, household debts and funeral expenses. Chapter 7 analyses the potential sources of income after

death of the breadwinner. Chapter 8 presents an analysis and interpretation of results, while chapter 9 describes the life insurance recommendation model that has been developed in this research. Finally, chapter 10 discusses the results of this research and identifies the implications for future research in this area.

Chapter 2

Literature Review

The literature review in this chapter is divided into two main sections. The first section discusses the concept of life insurance and its importance in financial planning. The second section discusses the concept of life insurance recommendation models and their development.

2.1 Human Life Value

The human life value concept is a widely used method for estimating the value of a person's life. It is based on the idea that a person's life has a certain value, and this value is determined by their income, expenses, and other factors. The human life value concept is used to determine the amount of life insurance that a person needs to purchase.

The human life value concept is based on the idea that a person's life has a certain value, and this value is determined by their income, expenses, and other factors. The human life value concept is used to determine the amount of life insurance that a person needs to purchase.

Chapter 2

Literature Review

This chapter presents a brief review of the literature relevant to the areas of human life value and needs analysis as well as the current life insurance practise with emphasis on the Malaysian scenario.

2.1 Human Life Value

The human life value concept is generally associated with life insurance. The concept however is not limited to insurance in its application and has been used in many other areas – an analysis of population to estimate the value of nation, life insurance programs, judicial awards in accidental death and disability liability cases, assessment of public policies and key value of a man.

One of the first attempts to estimate the monetary value of a human being was made in year 1691 by Sir William Petty. He used the concept of human capital to determine the capital value of nation. However, Petty's method makes no allowance for the cost of

maintenance of labour before capitalisation. In spite of this limitation, his procedure gives a close approximation for determining the capital value of a nation. It is wholly inadequate when used for the purpose where human capital values by age, sex and economic status (Kiker, 1966).

Johann H. Von Thunen in the second part of volume two of the *Isolated State* reflected upon the view of man as capital. He derived an equation to measure the value of a human life, but he died in year 1850 before completing this work and the equation was published after his death (Hofflander, 1966). Von Thunen states that should man be considered capital, it would be necessary for the state to compensate the family of every soldier killed for the cost of his upbringing, to pay the disabled soldier the amount of his upbringing with maintenance and finally to pay the soldier who returns healthy for the depletion of his strength.

The first truly scientific procedure and the one followed today by many economists and others for finding the money value of a human being was made by the well-known English statistician, William Farr (Dublin and Lotka, 1977; Hofflander, 1966 and Kiker, 1966). William Farr (1853) proposed that wealth is the present value of a person's net future earnings, which he defined as personal earnings less living expenses with allowance being made for death in accordance with an appropriate life table. This method is the basis of all subsequent human life value calculations. Theodore Wittstein in his *Mathematische Statistik und deren Anwendung auf Nationalökonomie unter Versicherungswissenschaft (Mathematical Statistics and its Application to Political Economics and Insurance Science)* (1867), proposed that Farr's present value of net

future earnings should be used to determine compensation for claims involving loss of life.

One of the earliest references to the human life value in life insurance was made by Jacob L. Greene. *An Agent's Work*, the Connecticut Mutual Life Insurance Company's manual of 1st January 1885, believed to have been written by Greene discussed the money value of human life as a foundation of life insurance (Hofflander, 1966). According to Greene, the money value of a person's life is the present value of what he may fairly be able to earn in the future and during his probable life. If he dies, his family loses that sum just as really, as if they lost that much in any other form of property. His life is their property and that sum is the value.

John Marshall Holcombe had been one of the first to recognise the possibilities of the human life value concept as a basis for marketing insurance when he pointed it in a speech given at the National Association of Life Underwriters (NALU) convention of 1900. Three years later, when he had become president of Phoenix Mutual, Holcombe was invited to join in Yale University's first course in Insurance. He discussed the application of the human life value concept to life insurance in his first lecture and again in an address before the Economic Club of Providence, Rhode Island in January 1906 (Norris, 1989).

In 1905, Miles M. Dawson proposed the use of actuarial principles for human capital evaluation (Kiker, 1966). He asserted correctly that the methods used by courts for determining compensation to others for the pecuniary injuries resulting from a death where another party is liable are unscientific. Actuarial science, utilising the capitalised

net earnings approach to human capital evaluation, he said furnished the means of computing the monetary value of life destroyed – given the age, net earnings and general health of the decedent.

The name most often associated with the human life value is Solomon S. Huebner. It was mainly through his efforts that the concept gained widespread recognition and acceptance. He began his discussion of the application of human life value concept to life insurance in his *Life Insurance* book published in 1915. In this book, he devoted a section of the ‘Capitalization of the Value of a Human Life and Indemnification of that Value’. The philosophy that governs his theory is that the family must be seen as a business, run according to business principles and protected against financial impairment or bankruptcy due to the loss of the spouse’s life, which has a certain economic value.

Huebner developed this concept further in 1927 with the publication of his *the Economics of Life Insurance* book. In this book, he discussed the human life value concept as the economic basis of life insurance, the monetary importance of human life values, the need for scientific treatment and methods for appraisal. Huebner capitalised a person’s contribution to his family over the period to retirement age, or to the end of his life expectancy.

In 1930, Louis I. Dublin and Alfred J. Lotka published a book in this area, *the Money Value of a Man*. They were interested in the approach used by Wittstein for determining the amount of life insurance a person should purchase. Their work extended Wittstein’s present value of net future earnings to consider mortality statistics.

Dublin and Lotka also have developed for business uses a series of tables, which should give the money value of persons at various ages, according to the amount of their earnings. These tables would be useful as a guide to life insurance agents in advising their clients, as a measure of what is in his effort to protect his family and as a measure of the cost of disease and premature death.

The works of Dublin and Lotka represents a real contribution in that it was the first to be devoted entirely to an estimation of the human life values of the population (Hofflander, 1966) and one of the best expositions available (Kiker, 1966). Unfortunately, the statistical base of the work is essentially a reflection of the limited availability of usable data at the time it was written (Hofflander, 1966).

Burton A. Weisbrod (1961) attempted to measure the value of a person in terms of his worth as a productive asset having some marginal productivity period. It is the present value of a person at any given age defined operationally as his discounted expected future earnings stream. Weisbrod then proceed to calculate the present values of gross and net future earnings of males by age in the United States for the year 1950. Furthermore, he discussed the usefulness of the concept and the implications of the results. The results may be applied to the population of the United States to obtain an estimate of the value of the nation's male human assets. The data also could be helpful in the preparation of personal life insurance programs as a guide for the development of workmen's compensation policy and for making of judicial awards in accidental death and disability liability cases.

Alfred E. Hofflander (1966) defined the concept of human life value both verbally and mathematically and showing how the concept might be applied to life in different fields. He developed a mathematical model of the human life value for life insurance by finding a single sum, which represents the amount necessary to replace the amount a person would normally have provided for his family had he lived. He also used the same techniques to establish a mathematical model of the money value of a person in cases of recovery for wrongful death.

Aponte and Denenberg (1968) questioned the method used by most human life value's authors because their computations relied on a static analysis by quoting a fixed face value at any given age. This is unsound as it leads to the recommendation of a purchase of a fixed amount of insurance, which becomes redundant at later ages and is likely to be financially prohibitive at early ages. They suggested that the concept of human life value should be translated into a dynamic expression, which will not be redundant as the value declines over the years. They also criticised the earlier authors of not giving any guidance to the kind of insurance that should be purchased. By inference, Aponte and Denenberg proposed decreasing term insurance to age 65 as the means to obtain adequate income protection with savings for retirement and other uses being provided for after the solution of income protection.

Frank W. Taylor (1975) developed a general model for planning an individual's life insurance program based on the principles used in economic evaluation of wrongful death. The model is based on the right of dependents as recognised by the courts in wrongful death cases to recover the present value of that part of the deceased's income, which they would have enjoyed.

John E. Scarbrough in his article titled *Measuring Human Life Value from the Courtroom to the Living Room* (1998) attempted to bring the life insurance industry's consideration of human life value concept. In practice, particularly in the United States, human life value is more often used in wrongful death litigation than in estimating life insurance needs. According to Scarbrough, without human life value as a guide, life insurance agents and financial advisers relying on needs analysis method and he believed that a person might find himself over-insured and subsequently accepts risks much greater than they know on insuring needs.

However, there are several issues overlooked in the application of the human life value concept as a life insurance selling tool. The weakness of using human life value to estimate the amount of life insurance is that it does not take into consideration there may be a capital needed immediately upon the death of the breadwinner to satisfy certain financial obligations, for instance funeral expenses, children education cost, mortgages and debts.

2.1.1 Definition of Human Life Value

Human life value as defined traditionally is the economic value of a human being measured by the capitalised monetary value of future earnings. William Farr's classic definition has been described by Dublin and Lotka (1930:12) as,

“The scheme setup by Farr computes the value of a typical individual of given capacity as the present worth of his net future earnings that is, his future earnings minus his personal cost of living allowance being made for deaths in accordance with an appropriate life table.”

Much of the concept of human life value is derived from the writings of Solomon S. Huebner. In *the Economics of Life Insurance* (1959), he defined the human life value in two different places. Both definitions are similar, but there are not identical. He first defined the human life value as,

“...the capitalized monetary value of the earning capacity resulting from the economic forces that are incorporated within our being”, (Huebner, 1959:5).

This is essentially a philosophical rather than a practical definition.

In a later section, he stated that it is,

“...the capitalized value (at the prevailing rate of interest) of the current earning power of the insured devoted to the support of family dependents” (Huebner, 1959:8).

Stephen R. Leimberg and Robert J. Doyle Jr. (1999) defined human life value as the present value of future earnings less taxes and expenses. Thus, human life value may be defined quantitatively as the present value of a person’s potential income after deducting personal expenses and tax liability over his estimated working lifetime. This would involve the estimation of the person’s income for each year from his current age to the date of retirement after taking into consideration some factors such as inflation and income growth. Using the present value, the worth of the money in a given number of years is calculated.

2.2 Needs Analysis

Because human life value concept has essentially been ignored in life insurance and financial services, the industry has created alternatives (Scarborough, 1998). The concept

of needs-based selling represents one of the most popular forms of analysis (Dorfman and Adelman, 1988; Skipper and Black, 1999). The needs analysis method is the life insurance agent's most commonly used sales tool (Scarborough and Norris, 1999; Daily, 2000) and has been used by most life insurance agents, financial advisers and financial-planning websites (Kite, 1997; Scarborough and Norris, 1999, Steuer and Kotlikoff, 2001; Daily, 2000).

Needs analysis has been around since the early days but it was refined in the late 1960's by Thomas J. Wolff. At the 1966 Million Dollar Round Table meeting, Thomas J. Wolff introduced the concept of capital preservation in estate planning and called it needs analysis. The purpose was to address the real as well as the immediate needs of the family after a breadwinner's death. In 1981, he designed a new financial needs analysis to suit the needs of single households and a two-income family. The plan is flexible so the life insurance agent can sell the type and amount of insurance best suited to the customer's lifestyle and income.

There are two approaches in needs analysis – capital liquidation approach with assumptions that all principal is exhausted at the end of the planning period or capital retention with assumptions that principal is not touched. A convenient compromise is to use the capital liquidation approach with an explicit goal of providing specified inheritance for the beneficiaries (Daily, 2000).

There are some weaknesses of using needs analysis as a life insurance sales tool. A needs analysis ignoring future changes (Kite, 1997; Scarborough, 1998) and only identifies the needs of a family at the current situation. Needs inevitably change in the

future as family characteristics and finances change. By ignoring these factors needs analysis would leave a person under-insured.

The needs analysis also raises several concerns. If a person sets a spending target too high for survivors, the method will generate a larger amount of life insurance than is appropriate. This will cause the person too much in life insurance coverage. If the spending target is set too low, the recommended amount will leave the person under-insured (Steuer and Kotlikoff, 2001). Moreover, a needs analysis does not explicitly take account of other financial planning goals such as having an adequate income in retirement (Daily, 2000).

2.2.1 Definition of Needs Analysis

Needs analysis is the job of assessing the beneficiary's requirements for cash for specific purposes and general living expenses. Existing assets including life insurance and post-death sources of income that could satisfy some of those requirements are identified. Any shortfall implies a need for additional life insurance.

Scarbrough and Norris (1999) clearly defined needs analysis as a method for identifying the needs a family would most like to continue covering after death discontinues the family's income, estimating the funds necessary to cover the identified needs, identifying existing sources of funds available to cover those needs and helping the prospects make trade-offs between the needs covered and the cost of insurance.

Daily (2000) suggested four steps in needs analysis:

1. Specify the after-death objectives.

2. Compute the present value of the resources needed to accomplish the objectives.
3. Compute the present value of the resources available to accomplish the objectives.
4. Life Insurance needed = Present value of resources needed - present value of resources available

According to Dorfman and Adelman (2002), needs-based analysis suggests that the amount of life insurance to purchase is an amount that fills the gap between an amount needed to maintain post-death living standards and the available post-death liquid or near liquid assets.

The logic is expressed in the following equation,

$$\text{Life Insurance needed} = \text{Post-death needs} - \text{assets available to meet post-death needs}$$

2.2.2 Needs Analysis and the Internet

The internet significantly affects and plays an important role for most industries including those selling services and intangible products like life insurance. Numerous life insurance related websites on the internet provide information about life insurance products, rate and quotes as well as information on insurance companies and insurance agents.

There are hundreds of websites provide various forms of calculators and make calculations based on different methodologies. There are at least two different types of

calculators – needs analysis and human life value. Needs analysis method is by far more popular (Elger, 2003). Likewise, Scarbrough and Norris (1999) merely found two human life value online calculators while calculators for needs analysis are abundant on the internet. Dorfman and Adelman (2002) discussed and described the advantages and drawbacks to each of these theories before analysed the quality of life insurance recommendations generated by internet websites. They found that these recommendations generally were unreliable and wide variations in advice. Two possibilities exist for bad output from these calculators is because of there is an inadequate input or the underlying mathematical model is inaccurate or illogical. A study by Elger (2003) also found that there was a vast range of results for a given set of data using online calculators on the internet.

Scarbrough and Norris (1999) argued the use of needs analysis as a way to determine the right amount of life insurance. They have accessed several needs calculators on the internet and found that there were a great ambiguity regarding what constitutes a need, how to measure it and how to convert future needs to a present lump sum. As an analytical engine, needs analysis is really no matter than asking three basic questions:

“What money do you think your family will want after you die?”

“What do you think they will have after you die?”

“How much of the difference do you want to pay for while you live?”

They suggested that needs must incorporate the reality that the family’s standard of living changes over time and not simply because of inflation. The projection of a changing in standard of living is an integral element of human life value method. Nevertheless, Adelman, Dorfman and Wells (2003) stressed the need to follow the

needs-based approach from their analysis of ninety-nine websites that provide life insurance calculators.

2.3 Other Methods to Calculate Life Insurance Needs

There are several other methods that can be used to calculate the appropriate level of life insurance a person should carry, for instance net worth analysis and income replacement method.

Net worth analysis is the value of all a person's assets minus the total of all his liabilities. If the person owes more than his own, he will have a negative net worth and that would be the amount he needs to insure.

The income replacement method focuses on the replacement of some percentage of income for a specified period of time. The value of the income replacement can be calculated and compared to the assets a person currently have. Any difference between needs and resources can be funded with life insurance.

Another way to calculate life insurance needs is using the economic approach which is based on the life-cycle model of saving developed by Ando and Modigliani (1963) and the canonical model of life insurance developed by Yaari (1965). The goal of the economic approach is to smooth household's living standards over their life-cycle and to ensure comparable living standards for potential survivors. In the economic approach, spending targets are endogenous. The targets are derived by calculating the most that each household can afford to consume in the present given that it wants to

preserve that living standard into the future (Gokhale, Kotlikoff and Warshawsky, 2001). Economic Security Planner, known as ESPlanner² software program was developed by Douglas Berheim, Jagadeesh Gokhale and Laurence Kotlikoff based on this approach.

2.4 Life Insurance Selling Practise Review

This sub-section provides information on some life insurance selling practise used by life insurance agents and financial advisers.

2.4.1 Fact-finding Interview

Prior to Dr. Huebner, policies were sold without attempting any measurement or rationale for the purchase (Wolff, 1991). Then, for many years professional life insurance agents and financial advisers have been using the fact-finding interview to establish exactly what the prospect's needs are and the resources he has available to meet them.

In establishing the need, the life insurance agent and financial adviser plans with the client and creates a financial blueprint of his obligation to the family and himself. They consider the amount of insurance the client currently owns, his social security benefits and other sources of income. By properly utilising all the information gathered during the fact-finding stage, life insurance agent and financial adviser could estimate the amount of life insurance coverage that the client need. Usually, life insurance proceeds

² ESPlanner is a financial planning software developed by Economic Security Planning Inc. based on economic approach.

are used to cover immediate capital needs such as debt repayment including mortgages, educational funds and the long-term income needs of survivors. Certain assumptions pertaining to interest rates and income tax brackets play a significant role in determining the amount of life insurance needed.

However, this approach is deficient in that few people can possibly insure against all future contingencies given the persistency of inflation and other changes affecting one's lifestyle. Needs setting is much like goal setting. No one ever said that once having set certain goals that the goals remained static or that they could all be initially fulfilled. Nevertheless, such goals are targets, subjects to revision during a person's lifetime. Recommending revisions is also a basic function of the life insurance agent and financial adviser.

2.4.2 Professional Life Insurance and Financial Planning Software

As technology advances, life insurance agents and financial advisers are turning to technology for the latest tools to boost sales efforts and aid in serving customers. Professional life insurance and financial planning software becoming more than just a tool to help them.

There are at least two different types of software programs – needs analysis and human life value. Most financial planning software available is using the needs analysis method, for example LifeGuide, IncomeMax, COSS Journey and SunGard's Finpack. Ph.D. LIFE is a software program that allows life insurance agents or financial advisers to calculate a client's human life value in scientific terms to determine the amount of money a family would need at death to replace their financial loss.

The LifeGuide Professional software is designed for life insurance agents and financial advisers to give unbiased, consumer-oriented and comprehensive information to assist clients in the making of informed life insurance buying decisions. Using LifeGuide's life insurance needs analysis functions, life insurance agent and financial advisers can quickly and accurately assess the client's current and future life insurance needs while taking into account any insurance they currently have in force.

IncomeMax sales software by Cygnus Software Inc. provides needs analysis and retirement planning sales solutions for life insurance and financial planning professionals. The software allows life insurance agents and financial advisers to determine the amount of life insurance coverage needed, the appropriate types of protection, alternate solutions and planning priorities.

COSS Development Corporation has developed COSS Journey software that includes needs analysis. Other professional life insurance and financial planning software that provides needs analysis are SunGard's Finpack by SunGard Insurance Systems.

The largest life insurance company in Malaysia, Great Eastern Life Assurance (Malaysia) uses a software known as GEMS (Great Eastern Life Marketing System) developed by DynaFront. GEMS aims to empower Great Eastern Life's life insurance agents with the latest technology to assist them in delivering the best possible quality services to their customers. The software includes a personal financial analysis tool that can analyse customer financial needs using needs analysis.

Similar goes to other life insurance companies' agent software such as MCIS Zurich's InsureConnect developed by I-Systems that includes need analysis in their software; and Malaysian Assurance Alliance's myLife developed by OpenSys that also uses the needs' analysis tools.

Ph.D. LIFE is a software based on human life value method developed by Litigation Analytics Inc., a litigation economics-consulting firm specialising in evaluation and testimony regarding economic damages arising from personal injury and wrongful death.

In 1991, Litigation Analytics began offering a module of its litigation software for analysing the economic loss to a family caused by the death of the breadwinner. This software enables life insurance professionals to calculate the human life value of their client and has been accepted by the life insurance industry as the first credible measure of a client's human life value.

ESPlanner is a financial planning software developed by Economic Security Planning Inc. based on economic approach. Most of life insurance and financial planning softwares make a person set their own saving and life insurance targets; however, ESPlanner finds the targets for the client by doing life-cycle consumption smoothing to find the most they can spend today without suffering a drop in their future living standard. ESPlanner delivers its findings in the form of annual spending, saving, and insurance recommendations. Todd (2004) regarded ESPlanner as the pre-eminent financial planning software for determining an appropriate amount of life insurance to purchase. However, he commented on the software complexity as the primary

weakness. The software also requires an immense amount of details as input, and hence it is another weakness of ESPlanner (Fortune, 2000). The user must complete an enormous amount of information in eleven folders before calculations begin.

2.4.3 Online Financial Planning Tools

Many life insurance companies, broking firms, insurance agents and financial advisers offer interactive services such as online quotations and life insurance calculators on their websites to analyse an individual's financial condition and determine the appropriate amount of life insurance. For instance, the Portrait Planning financial tool set up by John Hancock in January 1997 provides worksheets for customers who browse as well as life insurance agents who sell to calculate their needs and their client's needs.

Metropolitan Life began to build the Life Advise section on their website in 1996 as a financial planning resource. Aetna's website features a retirement guide under the Aetna Retirement Services area. In that section of the website, Aetna has spotlighted a group of ten life events, which include first job, marriage, new home, mid-life evaluation, retirement, family loss and divorce. The website also features worksheets for doing financial self-analysis. A visitor to the website can use the worksheets to evaluate their income and outflow, net worth and calculate how much money they will need for retirement and how to reach that number. Once the worksheets are filled out, the software then calculates how much will be needed and how much the user will need to save every month to reach the goal.

Prudential's website features entire areas devoted to retirement planning, education

funding, insurance, investing and estate planning. Cigna's website has a similar range of financial planning features such as retirement planning calculators and college planning tools.

At present, there are two life insurance companies in Malaysia offering online financial planning tools on their websites – Mayban Life Assurance Berhad with their net worth calculator and Prudential Malaysia with life insurance calculator.

2.4.4 An Analysis of the Quality of Online Calculators in Calculating Life Insurance Recommendations (Case Study)

Many insurance companies, broking firms, insurance agents and financial advisers have a presence on the internet and this makes market more competitive.

Academic research on the economics of the web like Brown and Goolsbee (2002) has examined the effect of the internet on the life insurance industry and found that online life insurance shopping websites has had a major impact on prices of life insurance in the United States. The internet significantly enhances the efficiency of insurance markets and benefit consumers by lowering transaction and information costs. By making insurance more affordable, the internet will likely allow more insurance to be purchased. Ciccotello and Wood (2001) suggested that web resources could do an efficient job in some areas including insurance. According to them, web advice is more consistent on questions related to life insurance needs than live advice

Since the website is playing an increasing role in the delivery of financial advice, we will analyse the quality of online calculators in calculating the appropriate amount of life insurance recommendations.

Methodology

In this study, we begin with development of customer financial and personal profile to compare the recommendation amount of life insurance by various online calculators. Then, we created a fictional couple, both age 35 years old with two young children – age 15 and 10 years old to send to university.

We assumed that they have the following characteristic,

- The husband works as an executive and earns \$60,000 annually and his wife is a full-time housewife.
- Income growth is expected to be 4% per annum.
- Estimated retirement at age 65.
- Family expenses are \$3,000 per month.
- Tax expenses are \$15,132 (approximately 25% of earnings) annually based on individual income tax rates.
- The husband wishes to provide 100% of income replacement to the family for 20 years if he died.
- They hope to provide each of their children with a three-year undergraduate education for the cost of approximately \$10,000 per annum.
- Assets are \$40,000 including social security.
- Mortgage outstanding is \$80,000.
- Other debt outstanding is \$10,000.

- The cost of funeral is \$5,000.
- The family does not have any life insurance cover.
- Expected long-term investment return of 7% per annum and inflation rate of 3.5% per annum.

We used various search engines and key words to search internet web addresses that provide some form of online life insurance calculator. We obtained a sample of fifty-five websites that allowed consumers to input data resulting in life insurance amount recommendations.

We also found that there were several websites used the same online life insurance calculators. In this analysis, we have not removed duplicated results from the same calculators.

Financial variables and assumptions used in each online life insurance calculators were recorded and thereby we could identify the cause of differences in output by these online calculators.

Results

There are abundant of needs analysis calculators on the internet, yet we can only found two human life value calculators.

The calculations are summarised in table 2.1 and illustrated in figure 2.1.

Table 2.1: Summary of the Life Insurance Recommendations by Fifty-five Online

Life Insurance Calculators

Company and Country	Website URL	Number of Input	Life Insurance Amount (USD)
A&E Insurance and Financial Services, LLC, US	www.brianlsmith.com	7	1,046,098.00
About Life Insurance, UK	www.about-lifeinsurance.co.uk	10	1,315,000.00
AccuQuote, US	www.accuquote.com	5	928,273.00
ACME Insurance and Financial Services, Inc., US	www.acmequote.com	9	835,000.00
Advantage One Insurance and Financial Services, Inc., US	www.advantageoneinsurance.com	4	892,648.49
Advicenter Planning Group, US	www.advicenter.com	11	1,759,000.00
All Life Insurance Quotes, US	www.all-life-insurance-quotes.com	10	1,315,000.00
Broker Alliance Group Inc., US	www.insurancebag.com	11	1,330,000.00
Capital Plan, Inc., US	www.capitalplan.com	6	1,225,000.00
Charles Schwab & Co., Inc., US	www.schwab.com	9	1,310,000.00
Chicago Life Insurance Analysis, Quote and Policies, US	www.underwriter.com	4	977,000.00
Clark Family Pty Ltd., Australia	www.financialservicesonline.com.au	11	765,640.00
Connor Financial Corporation, Canada	www.cfc.dynip.com	7	907,143.00
Conseco, Inc., US	www.conseco.com	6	992,142.86
Countrywide Insurance Services, US	www.cwinsurance.com	9	1,315,000.00
Discount Life Insurance, US	www.discount-life-insurance.us	9	583,000.00
e.Insurance-Tools, US	www.einsurancetools.com	7	1,295,000.00
Essential Benefits Group, Canada	www.essentialbenefits.ca	11	1,006,098.00
FinAid Page, LLC, US	www.finaid.org	7	1,140,000.00
FinanCenter, US	www.financenter.com	10	1,849,346.00
Financial Calculators, Inc., US	www.fincalc.com	11	1,006,000.00
Free Insurance Quotes, Canada	www.free-insurance-quotes.com	8	986,098.00
Garden State Life Insurance Company, US	www.gardenstatelife.com	10	1,438,760.76
GenAmerica Financial Corporation, US	www.genam.com	9	972,142.00
Gquote and Term Life Quotes Online, US	www.gquote.com	9	553,000.00
Illinois Mutual Life Insurance Company, US	life.illinoismutual.com	11	992,658.00
Independent Financial Concepts Group, Ltd., Canada	www.ifcg.com	10	987,648.00

Table 2.1: Summary of the Life Insurance Recommendations by Fifty-five Online

Life Insurance Calculators (cont.)

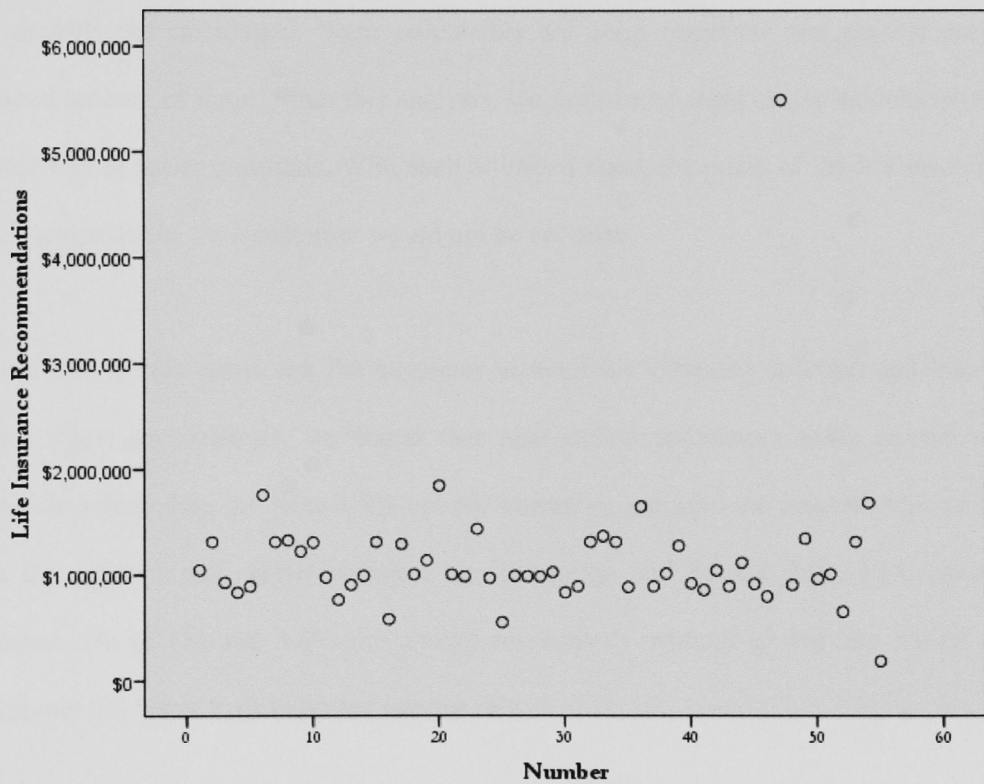
Company and Country	Website URL	Number of Input	Life Insurance Amount (USD)
InsuranceQuote Services Inc., US	www.iquote.com	9	985,142.86
Internet Insurance Services, Inc., US	www.for-quotes.com	10	1,027,648.00
iPipeline, US	www.ipipeline.com	9	835,000.00
Life Insurance Quotes, US	www.insurancecalculators.com	4	892,648.00
Life Saver Financial advisers, UK	www.life-saver.co.uk	9	1,315,000.00
Lifequotes Pty Ltd., Australia	www.lifequotes.com.au	7	1,370,000.00
LifeStyle Financial Services, Australia	www.lifestyle.au.com	8	1,315,000.00
Manulife Financial, Canada	www.maritimelife.ca	11	885,570.36
North Coast Financial Services, Australia	www.ncib.com.au	7	1,650,000.00
Placer Insurance Agency, US	www.placerins.com	4	892,648.49
Planner, Canada	www.planner.ca	11	1,012,658.00
Professional Benefit Services, Inc., US	www.pbsbenefits.com	9	1,277,857.00
Prudential Financial, Inc., US	www.prudential.com	9	920,200.00
Reinke & Associates, Inc., US	www.reinkeassoc.com	9	857,142.86
ReliaQuote, Inc., US	www.reliaquote.com	11	1,043,272.00
S.W.I., Inc., US	www.lowcostlifeinsurance.com	4	892,648.49
Smartmoney, US	www.smartmoney.com	9	1,115,000.00
SMF Funds Management Ltd., Australia	www.smf.com.au	11	915,161.00
Sovereign, New Zealand	www.sovereign.co.nz	10	795,136.00
Stebbing and Sohl Insurance, US	www.stebbingandsohl.com	6	5,495,000.00
TD Group Financial Services, Canada	www.tdcanadatrust.com	9	905,800.00
The Horace Mann Companies, US	www.horacemann.com	5	1,345,000.00
The Insurance Watch, Australia	www.insurancewatch.com.au	9	962,486.00
The Life and Health Insurance Foundation for Education, US	www.life-line.org	11	1,006,097.00
The Savings Bank Life Insurance Company of Massachusetts, US	www.sbli.com	5	651,667.00
William J. Afryl Agency, Inc., US	www.bafryl.com	8	1,315,000.00
The Life and Health Insurance Foundation for Education, US*	www.life-line.org	6	1,683,471.00
Illinois Mutual Life Insurance Company, US*	life.illinoismutual.com	6	184,229.67

Note: For non United States websites, we adjusted inputs and outputs to US dollars.

* Human life value calculators.

Source: Details of calculations refer to Appendix 1.

Figure 2.1: **Distributions of the Life Insurance Recommendations by Fifty-five Online Life Insurance Calculators**



We determined the reasons for a wide variation in life insurance recommendations by these online calculators. The main reason is the variation of assumptions underlying the website's calculation methodology. For example, most of the calculators ask the customer to determine the number of years the income is needed by the family in the event of the death of the breadwinner, but FinAid Page, LLC calculator assumes life

insurance needed by the family is until retirement age of 65, which is for 30 years of income provided in our case study. Some other websites assumes until life expectancy.

Most of the calculators skipped some important factors such as current savings, investment income, assets, debts and mortgages. This feature is missing from many online calculators, which inflate the amount of life insurance recommendations. For example, Stebbings and Sohl Insurance ignores current asset such as retirement benefits to simplify the calculation. Some calculators are quite simplistic and request only a limited amount of input. From this analysis, we discovered eight online calculators that asked five or fewer questions. With such a limited input, the result of the life insurance recommendations for a customer would not be accurate.

Some online calculators ask the customer to enter the expected inflation and interest rates. From our analysis, we found that nine online calculators using combo box function which does not have 3.5% option. Therefore, we used the nearest value of 4% for the inflation rate. Other websites like Sovereign and FinAid Page, LLC assume interest rate of 5% and 3.6% per annum respectively without giving any option for customer to choose their expected interest rate.

Although online calculators differ from website to website, the variables most typically included to determine the appropriate amounts of life insurance are – current expenses, current income, savings, investment income, retirement benefits and the amount of existing life insurance cover. Future expenses include items such as outstanding debts and mortgages; funeral expenses, children's education fund and the amount of income needed for the family to maintain their current standard of living in the event of the

death of the breadwinner. Additional factors typically used in online calculators include taxes, inflation rate and investment yield. Using these online calculators, customers need to provide answers and enters the amount of coverage they seek.

Since the online calculators use different calculation methodology and assumptions, there was a great inconsistency among them. Using needs analysis calculators in this case study, the amount of life insurance the calculators recommended varied from \$553,000 to \$5,495,000. We found only two human life value calculators on the internet – The Life and Health Insurance Foundation for Education (LIFE) and Illinois Mutual Life Insurance Company. These two online calculators showed tremendous differences in the amount of life insurance recommendations, which are \$1,683,471 and \$184,229 respectively.

Conclusion

The internet is not only facilitates transactions and speed up the process, but there is a deeper significance to online business including selling life insurance.

The benefits to individuals purchasing life insurance over the internet might include the privacy of information. Some customers feel there is a downside to do business with friends or even someone unknown, who then are aware of their personal financial situation. Therefore, customers can enjoy the convenience of buying life insurance online and enter the most accurate information and details on the online calculators.

Another benefit of buying life insurance online is being able to take the customer's own time, gather as many information and use various online calculators from difference

websites before deciding on how much life insurance should be purchased. However, a huge variation in the amount of life insurance recommendations tends to make customers confused.

We believe a proper analysis of life insurance needs by online calculators should be performed to increase the efficiency of the market in the future.

2.5 Life Insurance Selling Practise in Malaysia

This sub-section provides information on the regulations effecting life insurance selling practise in Malaysia and case study on life insurance recommendations by Malaysian life insurance agents and financial advisers.

Malaysia has 86,230 life insurance agents from 16 life insurance companies and 35 insurance broker companies (Central Bank of Malaysia, 2004). All life insurance agents are registered with Life Insurance Association of Malaysia (LIAM) and must pass the examination conducted by the Malaysian Insurance Institute (MII). In Malaysia, a life insurance agent is not allowed to represent more than one life insurance company, other than the company, which appointed him. An insurance broker is an insurance salesperson or corporate entity who operates independently of any life insurance company.

2.5.1 Regulations

The principal legislation governing the life insurance business is the Insurance Act

1996³, which came into force on 1 January 1997. The Act is supplemented by the Insurance Regulations, which prescribe the details of mandatory requirements contained in certain provisions of the Act. In addition, the Act empowers Central Bank of Malaysia to specify matters pursuant to the provisions of the Act.

The Life Insurance Association of Malaysia (LIAM) is a trade association registered under the Societies Act 1966 to enhance the professionalism of the agency force and promote greater discipline and sound business practices among member companies. It is a statutory requirement under section 22 (1) of the Insurance Act 1996, (or section 3(2)(e) of the repealed Insurance Act 1963) for all life insurance and life reinsurance companies to be members of LIAM.

In Malaysia, there have been significant increases in the amount of regulation surrounding the conduct of life insurance selling in the industry. Central Bank of Malaysia together with Life Insurance Association of Malaysia (LIAM) have introduced policies and formulated framework on selling practise for life insurance business to enhance professionalism in the sale of life insurance products.

Code of Ethics and Conduct for the Life Insurance Industry, 1990

The Code of Ethics and Conduct for the Life Insurance Industry has been introduced in 1990 by Life Insurance Association of Malaysia (LIAM) and approved by Central Bank of Malaysia. The Code comprised three parts - Guidelines on the Code of Conduct, Code of Ethics and Conduct for Life Insurance Selling, and Statement of Life Insurance Practice. The objective of The Code is to promote and maintain the highest degree of

³ Replacing the previous Insurance Act, 1963.

standards and integrity among employees and intermediaries in the life insurance sector.

Part II (Life Insurance Selling) of the Code of Ethics and Conduct says that,

“The intermediary shall ensure as far as possible that the policy proposed is suitable to the needs and not beyond the resources of the prospective policy owner” (Life Insurance Association of Malaysia, 1999b).

Code of Good Practice for Life Insurance Business, 1998

The Code sets out the rules for life insurance companies to maintain certain minimum standard in the design and sales of life insurance products. In order to maintain a high standard of professionalism in the sales of life insurance products, the Code provides illustration formats, prescribes standards and specifies disclosure that are required to achieve fair pricing of products, truth in selling with full disclosure and proper advise to customers.

Guidelines on Proper Advise Practices for Life Insurance Business, 2004

In a move to enhance professionalism of the insurance intermediaries, Central Bank of Malaysia and Life Insurance Association of Malaysia (LIAM) have formulated a Guideline on Proper Advise Practices for Life Insurance Business in July 2004. These set the minimum standards for proper advice and a structured process for the sale of life insurance products by intermediaries. Intermediaries are required to obtain sufficient information on the prospective policyholder prior to rendering appropriate advice on the suitability of a particular insurance product

Under the Guidelines, Malaysian life insurance agents and financial advisers must

conduct the need-based analysis to evaluate the prospective policyholder's earnings, annual expenditure, financial obligations, assets and liabilities and even funeral expenses. This Guideline is a part of Central Bank of Malaysia's moves to improve insurer, intermediary and consumer relations while strengthening consumer protection and public confidence in the industry.

The Guidelines outline a structured sales process that an intermediary is required to follow when advising and selling a life insurance product as follows:

- **Disclose of intermediary's status**

At the earliest reasonable opportunity, the intermediary should provide a written disclosure to the prospective policyholder on the intermediary's personal details, the insurer that the intermediary represents and the range of products the intermediary is allowed to sell.

- **Fact-finding on the Prospective Policyholder**

An intermediary should obtain sufficient information about his prospective policyholder before giving advice or concluding an insurance contract. This process is commonly referred to as a fact-finding. The fact-finding on the prospective policyholder should provide an analysis of the prospective policyholder's personal and financial circumstances leading to clear identification of his financial needs and priorities so that a suitable and affordable life insurance product can be recommended by the intermediary.

- **Financial Needs Analysis**

The objective of the financial needs analysis process is to ensure that the products recommended are suitable to the customer. Given the information arising from the fact-finding, the intermediary needs to conduct a financial analysis, which could cover income protection, provision for retirement, children's education and savings and investment plans.

- **Product Recommendations and Record**

The intermediary should analyse the information provided by the prospective policyholder before recommending the purchase of life insurance products. The intermediary should provide enough information and assistance so that the prospective policyholder can make an informed decision before he makes a final commitment to buy a life insurance policy. The product recommendations to a prospective policyholder should be recorded in the record of advice section of the Customer Fact Find (CFF) form.

The CFF contains the types of products identified as suitable and why they are likely to satisfy the prospective policy owners' financial needs and objectives. After the purchase of the life insurance product, the insurer will issue Confirmation of Advice to the policyholder together with the life insurance policy.

With these requirements set by the Guidelines on Proper Advice Practices for Life Insurance Business, intermediaries have to be more accountable for their advice and the type of life insurance products recommended to the policyholders. This will enhance the

quality and professionalism of life insurance agents and minimise instances of improper selling. The Guidelines would also enable the prospective policyholder to better understand his financial needs and make a more informed decision when purchasing life insurance products.

2.5.2 Financial Advisers

The financial planning industry in Malaysia comprises a wide spectrum of financial professionals from the unit trust, insurance, accounting, banking, investments and securities industries.

The services provided by financial advisers include analysing the financial planning needs of an individual or households in relation to insurance products, recommending the appropriate type of products, sourcing them from licensed insurers or arranging the insurance contracts. In addition to insurance products, they may also provide advice and market other financial products to the client.

The Securities Commission of Malaysia introduced legislation through amendments made to the Securities Industry Act in 2003 to regulate financial planning and the use of the title or related-title of financial adviser or to conduct activities related to financial planning. In 2005, with the enactment of the Insurance (Amendment) Act 2005 and the Insurance (Amendment) Regulations 2005, Central Bank of Malaysia announced that the regulatory framework is in place for the licensing of financial advisers. However, life insurance agents and brokers are exempted from licensing as a practising requirement.

One of the basic requirements to apply for a financial adviser licence in Malaysia is that the key company officers must be a Registered Financial Planner (RFP) qualification as conferred by the Malaysian Financial Planning Council (MFPC) or other professional qualifications as specified by the Central Bank of Malaysia.

2.5.3 Survey on the Method and Amount of Life Insurance Recommendations

As mentioned above, under The Guideline on Proper Advise Practices for Life Insurance Business, a life insurance agent or financial adviser is required to conduct a fact-finding and analysis of the financial needs of the prospective policyholder before presenting his recommendation. Therefore, this survey looked at the details been asked in the fact-finding interview, the method used and the amount of life insurance recommendations.

Methodology

This survey involved forty life insurance agents and financial advisers from various life insurance companies who have been asked to make a recommendation on the amount of life insurance should be purchased. The survey was held between 1 December to 31 December 2004 in Klang Valley⁴, Malaysia.

We created the following customer financial and personal profile for the purpose of this survey:

⁴ Klang Valley is the area in central Selangor, Malaysia comprising Kuala Lumpur and its surroundings and suburbs. In 2005, the population in this area is estimated to be 5.8 million (Department of Statistics, 2006).

- A single woman age 28 earns RM60,000 annually.
- Estimated retirement at age 55.
- Total assets of RM170,000 and total liabilities of RM150,000.
- The woman does not have any life insurance coverage.
- The insurance agents and financial advisers provide other information required such as estimated interest rate, estimated rate of inflation, employee provident fund's contribution rate and funeral cost.

Forty life insurance agents and financial advisers were selected using random stratified sample. Within each life insurance company, a number of life insurance agents were randomly selected with the chance of selection equal to their proportional size in the market share. The life insurance agents and financial advisers were then selected at random from the Malaysian Life Insurance Institute (MII) agent listing.

Table 2.2: Summary of Sample Size for the Survey of on the Method and Amount of Life Insurance Recommendations

Insurance Company	Market Share (%)	Number of Sample
Great Eastern Life Assurance (Malaysia) Berhad	29.62	12
ING Insurance Berhad	16.26	7
American International Assurance	14.14	6
MCIS Zurich Insurance Berhad	5.84	2
Malaysian Assurance Alliance Berhad	4.61	2
Allianz Life Insurance Malaysia Berhad	4.60	2
Hong Leong Assurance Berhad	4.38	2
Prudential Assurance Malaysia Berhad	3.88	2
John Hancock Life Insurance (Malaysia) Berhad	3.72	1
Asia Life (Malaysia) Berhad	3.50	1
Malaysia National Insurance Berhad	3.21	1
AmAssurance Berhad	2.77	1
Mayban Life Assurance Berhad	1.90	1
Uni.Asia Life Assurance Berhad	0.75	0
Tahan Insurance Malaysia Berhad	0.56	0
Commerce Life Assurance Berhad	0.26	0
Total	100.00	40

Four individual were hired in this survey and acted as a prospect or client. Using the same customer financial and personal profile, each of them approaching ten life insurance agents and financial advisers, seeking a comprehensive financial plan and the amount of life insurance recommendations.

Results

Table 2.3 provides a summary of the advice and life insurance recommendations by forty life insurance agents and financial advisers in this survey.

Table 2.3: Summary of the Life Insurance Recommendations by Forty Malaysian Life Insurance Agents and Financial Advisers

Insurance Agent	Customer Fact find?	Details needed	Method or Tools	Recommended Amount (RM)
1	No	1. Annual income	5 x Annual Income	300,000
2	No	1. Annual income 2. Total assets 3. Total liabilities	Net Worth Analysis*	200,000
3	No	1. Annual income	10 x Annual Income	600,000
4	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000
5	No	1. Annual Income	10 x Annual Income	600,000
6	No	There are 30 details needed**	Needs Analysis	174,090
7	No	1. Annual income	10 x Annual Income	600,000
8	No	1. Annual income 2. Total assets 3. Total liabilities	Net Worth Analysis	200,000
9	Yes	1. Age 2. Annual income 3. Total liabilities 4. Education cost for children 5. Number of children 6. Estimated inflation rate 7. Estimated interest rate	Needs Analysis	1,000,000
10	Yes	1. Annual income before tax 2. Percentage of income needed by dependents 3. Age 4. Number of years benefits are needed 5. Estimated inflation rate 6. Estimated interest rate	Needs Analysis	275,550

Table 2.3: Summary of the Life Insurance Recommendations by Forty Malaysian

Life Insurance Agents and Financial Advisers (cont.)

Insurance Agent	Customer Fact find?	Details needed	Method or Tools	Recommended Amount (RM)
11	No	1. Annual income	5 x Annual Income	300,000
12	Yes	1. Annual income 2. Expected monthly expenses 3. Spouse income 4. Final expenses 4. Total asset 6. Total liabilities 7. Education cost for children 8. Current life insurance coverage	Needs Analysis	250,000
13	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000
14	No	1. Annual income	10 x Annual Income	600,000
15	No	1. Annual income	15 x Annual Income	900,000
16	No	1. Annual Income	10 x Annual Income	600,000
17	Yes	1. Age 2. Annual income 3. Total liabilities	Needs Analysis	500,000
18	No	1. Annual income	3 x Annual Income	180,000
19	No	1. Annual income	10 x Annual Income	600,000
20	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000
21	No	1. Annual income	5 x Annual Income	300,000
22	No	1. Annual income	5 x Annual Income	300,000
23	Yes	1. Annual income before tax 2. Percentage of income needed by dependents 3. Age 4. Number of years benefits are needed 5. Estimated inflation rate 6. Estimated interest rate	Needs Analysis	385,769
24	No	1. Annual income	10 x Annual Income	600,000
25	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000
26	No	1. Annual income	5 x Annual Income	300,000
27	Yes	1. Desired annual replacement income 2. Estimated inflation rate 3. Estimated interest rate 4. Number of years benefits are needed	Income Replacement***	330,300
28	No	1. Annual income	10 x Annual Income	600,000
29	No	1. Annual income	10 x Annual Income	600,000
30	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000
31	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000

Table 2.3: Summary of the Life Insurance Recommendations by Forty Malaysian

Life Insurance Agents and Financial Advisers (cont.)

Insurance Agent	Customer Fact find?	Details needed	Method or Tools	Recommended Amount (RM)
32	Yes	1. Annual income 2. Age 3. Spouse's age 4. Final expenses 5. Total assets 6. Total liabilities 7. Education cost for children 8. Number of children 9. Estimated inflation rate 10. Estimated interest rate 11. Number of years benefits are needed	Needs Analysis	550,000
33	No	1. Annual income	10 x Annual Income	600,000
34	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000
35	No	1. Annual income	5 x Annual Income	300,000
36	No	1. Annual income	10 x Annual Income	600,000
37	Yes	1. Annual income before tax 2. Percentage of income needed by dependents 3. Age 4. Number of years benefits are needed 5. Estimated inflation rate 6. Estimated interest rate	Needs Analysis	385,769
38	No	1. Annual income	10 x Annual Income	600,000
39	Yes	1. Annual income 2. Total assets 3. Total liabilities	Net Worth Analysis	180,000
40	No	1. Annual income 2. Expected retirement age	Annual Salary x Year to Retirement	1,620,000

Note: * Net Worth Analysis = Total Assets – Total Liabilities

If negative Net Worth, then

Life Insurance Recommendation Amount = |Net Worth| + 3(Annual Income)

If positive Net Worth, then

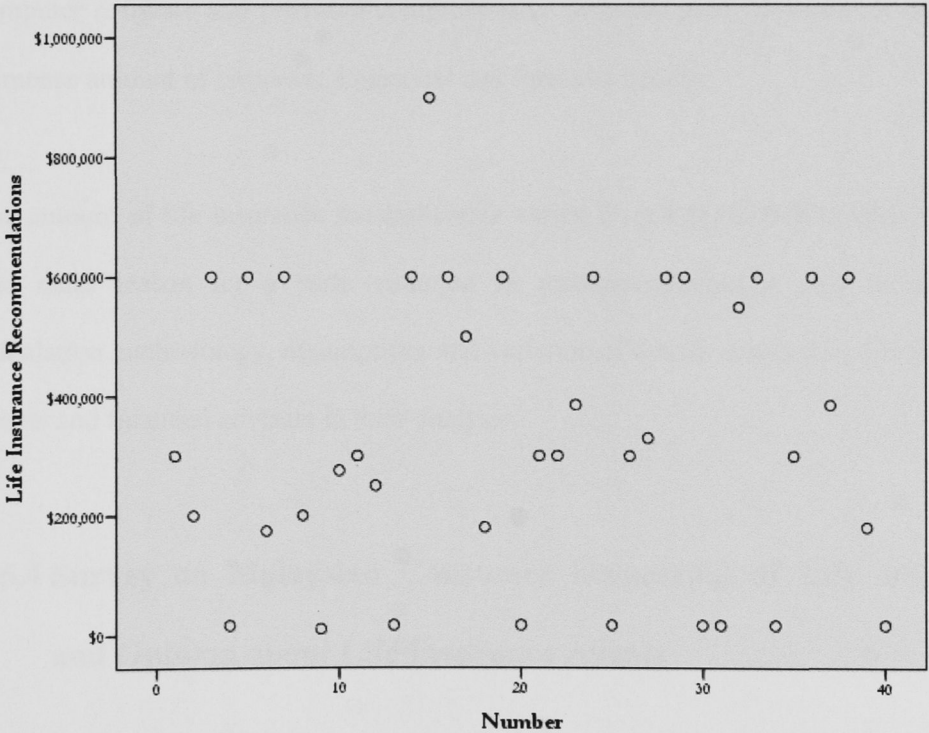
Life Insurance Recommendation Amount = 3(Annual Income)

** Personal information (date of birth, gender, marital status and race), assumptions and other information (expected age of retirement, expected rate of inflation, expected return on assets, employee provident fund's contribution rate), risk profile (readily available of cash, inflation, available of passive income, increase in value of assets, complexity of investment), spouse and dependents, annual income (annual gross salary, expected annual increase, annual bonus, expected annual increase, other income, expected annual increase).

*** The Income Replacement Method assumes that the purpose of insurance is to replace the income that a person would have brought home to the family.

Figure 2.2 illustrates the results.

Figure 2.2: **Distributions of the Life Insurance Recommendations by Forty Malaysian Life Insurance Agents and Financial Advisers**



In this survey, we found that thirty-two out of forty life insurance agents and financial advisers (80%) did not conduct fact-finding as required under the *Guideline on Proper Advise Practices for Life Insurance Business* before presenting their life insurance recommendations. At least 90% of them wanted to close the sale during the first appointment.

Our survey also showed that twenty life insurance agents and financial advisers (50%) used the rule of the thumb in determining the recommended amount of life insurance coverage – five and ten times annual income. Seven (17.5%) used needs-based analysis, thirteen (32.5%) used other methods, and none with human life value method.

Most of life insurance agents and financial advisers quoted a recommended amount of cover with no explanation of how they arrived at that figure. Only one (2.5%) used computer software and provided comprehensive financial plan. However, it needed an immense amount of customer's personal and financial details.

The amount of life insurance recommended varied from RM180,000 to RM1,620,000. The main reason for a wide variation in recommendations is that the different calculation methodology, assumptions and variation of details required by life insurance agents and financial advisers in their analysis.

2.5.4 Survey on Malaysian Consumer Ownership of Life Insurance and Opinion about Life Insurance Agents

Consumers rely on life insurance agents and financial advisers to provide advice and recommendations on the appropriate amount of life insurance. The objectives of this

survey were to investigate Malaysian consumers' ownership of life insurance and their opinion about life insurance agents.

Methodology

The survey was conducted via face-to-face interviews between 1 November to 31 November 2004 involving 440 respondents over age of 18, selected randomly in Klang Valley, Malaysia. Respondents were questioned on the level of life insurance ownership, their willingness to spend time with life insurance agents and financial advisers for advice, the fact-finding interview process, the tools used to compute the customer's life insurance coverage recommendation as well as the amount proposed.

Results

This survey found that 48% of respondents had no life insurance coverage. Further 24% of respondents who do not have any life insurance policies said they have not been approached to buy life insurance products by any life insurance agents or financial advisers.

Life insurance is a complex product. A good life insurance agent or financial adviser not only sells insurance, he also helps individuals, families, and businesses to purchase life insurance policies that provide the best protection for their lives. However, this survey showed that a significant majority of the respondents are not willing to spend much time with life insurance agents or financial advisers for consultation.

We recorded three responses of how much time respondents would be willing to spend with life insurance agents or financial advisers, in order of their frequency:

1. Less than 20 minutes (71%)
2. Less than 1 hour (21%)
3. More than 1 hour (8%)

The concept of needs-based selling represents one of the most popular forms of analysis to determining the amount of life insurance needs. Life insurance agents and financial advisers use the fact-finding interview to establish exactly what the prospect's needs are and the resources he has available to meet them. The most common needs the life insurance agent covers during the fact-finding interview are the personal information, spouse and dependents details, annual income, expected annual increase in income, monthly expenses, saving, securities and unit trust, real estate, mortgage and loans, education cost for children, credit card outstanding, employee provident fund and retirement plan. However, the survey found that 75% of respondents preferred not to provide so many details about themselves to life insurance agents or financial advisers and considered the information as private and confidential.

Results regarding consumer opinion about life insurance agents and financial advisers indicated that consumers believed the industry lacked the tools required to estimate the recommended amount of life insurance coverage. The majority of respondents who have life insurance policies (61%) said that their life insurance agents and financial advisers used the rule of thumb to determine the amount of life insurance needs. Only 23% of respondents said that their life insurance agents and financial advisers used the method of needs analysis and 16% other methods.

2.5.5 Alternative Method should be Developed

Findings from these surveys suggest that most of life insurance agents and financial advisers in Malaysia rely on traditional rules of thumb to decide how much life insurance to carry. These rules are easy to understand, easy to apply and can be used by everyone.

Some life insurance agents and financial advisers used needs analysis, net worth analysis and income replacement method, which involves much more fact-finding. From the survey, we found that consumers did not like to disclose too much of their personal information and financial details to life insurance agents or financial advisers in seeking advice and considered the information as private and confidential. Furthermore, consumers do not really like to spend much of their time with life insurance agents and financial advisers during consultation and most of them can only allocate less than 20 minutes for consultation.

Therefore, an alternative method that minimises the number of questions and asks only a few important questions such as marital status, current age and current income should be developed.

Chapter 3

Research Methodology

This chapter describes the research design and methodology that we employed in this research in the process of data collection, analysing and interpretation of data. The chapter begins with a description of the research design that we followed in this research. It continues with the demographic background of Malaysia as a case study in this research, description of the research methodology, data sources and limitations of the research.

3.1 Research Design

The needs analysis is commonly used by most life insurance agents, financial advisers and insurance calculators on the internet. This method attempts to determine the amount of life insurance a person needs by looking at two categories – post death needs and asset available to meet post death needs. Post death needs consist of the amount of capital needed after death of the breadwinner, for instance children education fund, household debts and funeral expenses. The post death needs is then compared with

assets that are already available. The extra capital necessary to fill this gap determines the amount of life insurance needs.

Needs analysis only identifies the needs of a family at the current situation. As we know, needs will be different in the future as family characteristics and finances change. Therefore, needs analysis must be revised to incorporate the reality that the family's standard of living changes over time. The projection of a changing standard of living is a part of human life value analysis.

The same applies to human life value. By using human life value alone to determine the amount of life insurance needs would leave a person under or over-insured. The weakness of human life value is that it does not take into account that there may be a capital need immediately upon the death of the breadwinner as projected using needs analysis.

Both human life value and needs analysis do not explicitly mean having an adequate income in retirement. It would also be affected by surviving spouse's age and ability or inability to work.

Therefore, this research combined both methods and concepts of needs analysis and human life value with a few revisions to create a powerful methodology to determine the amount of life insurance needs – a method that we name the 'Revision Method'.

3.2 Revision Method – The Case of Malaysia

A case study method was selected for this research. We chose three major races in Malaysia namely Malays, Chinese and Indians as a case study for the application of the revision method.

These three distinct major races in Malaysia with their different cultural and socio-economic characteristics provide an opportunity for a comparative analysis of marriage patterns and family formations; and finally to estimate the amount of life insurance need to carry to the real value of earnings within the context of one country.

3.2.1 Country Background

Malaysia is located in the heart of Southeast Asia. It covers an area of about 329,758 square kilometres and is divided into two geographical regions – Peninsular Malaysia to the west and East Malaysia to the East. Peninsular Malaysia is located south of Thailand, north of Singapore and east of the Indonesian island of Sumatra. East Malaysia, comprising the states of Sabah and Sarawak is located on the island of Borneo and shares borders with Brunei and Indonesia.

Administratively, Malaysia is divided into 13 states including the federal territories of Kuala Lumpur, Putrajaya and Labuan.

Figure 3.1: Malaysia map



Source: Britannica Online Encyclopedia

According to the 2004 census, Malaysia has a population of 25.5 million (Department of Statistics, 2004) comprises of many racial groups where Malays, Chinese, Indians and other small indigenous groups live in cultural harmony. One of the unique features of Malaysia is its multi-racial population with a rich cultural heritage.

Although Islam is the official religion, the Constitution of Malaysia provides for freedom of religion for people of other faiths to practice. Bahasa Melayu (Malay language) is the national language of the country. However, the people are free to use their mother tongue and other languages. English as the second language is widely used.

3.2.2 Brief History

The Malay word *Orang Asli* means literally ‘original people’ and implies the original inhabitant of the land. Archaeological and linguistic evidence supports the theory that

ancestors of *Orang Asli* arrived on the Peninsular from Thailand, Burma and South China between 8,000 and 2,000 BC (Bellwood, 1985). The Malays probably arrived from Borneo and Sumatra during a later migration around 1000 BC. Most *Orang Asli* were assimilated to this new migration or moved inland where they lived as hunter-gatherers and swidden horticulturists (Ryan, 1976). Malay settlements grew along the coasts and many became centres of trade with China and India.

The major consequence of the British colonial period⁵ was massive immigration from China and India that created its present multi-racial community in Malaysia. Most of this immigration took place during the late 19th and early 20th centuries, encouraged as a source of cheap and reliable labour for the tin mines and rubber plantations in the Malay Peninsular⁶.

The Chinese traded with the Malay Peninsular for centuries, but it was not until the 19th century that the migrants from Southern China came in droves to seek their fortune in the tin mines. The Chinese introduced a new mining technique, which marked the change in scope of the old industry. Malay rulers went into active partnership with the Chinese miners. Until the end of the 19th century tin mining in the Malay states was still very largely a Chinese enterprise and even as late as year 1912, 80% of tin production was under Chinese management (Kennedy, 1970).

⁵ In 1826, the British settlements of Singapore, Penang and Malacca were combined to form the Colony of the Straits Settlements and gradually increased its control over the rest of the Peninsular Malays. After World War II and the Japanese occupation from 1941 to 1945, the British created the Malayan Union in 1946. This was abandoned in 1948 and the Federation of Malaya emerged in its place. The Federation gained its independence from Britain on 31 August 1957. In September 1963, Sabah, Sarawak and Singapore combined with Malaya to form Malaysia, but two years later Singapore withdrew from the confederation.

⁶ Now known as Peninsular Malaysia.

Even though Malay Peninsular's main attractions were its tin and gold mines, but the British also introduced rubber trees from Brazil in 1877 (Andaya and Andaya, 1982). Rubber soon became Peninsular Malaya's staple export, stimulated by booming demand from European industry. All these industries required a large and disciplined labour force, and the British did not regard the Malays as reliable workers. The solution was the importation of plantation workers from India, mainly Tamil-speakers from South India. Some of them also came to work in the construction of buildings, roads and bridges.

The effect of British colonialism in Malaysia was to create distinct racial divisions, with each group remaining culturally unique, engaged in different economic activities and separated geographically. Furthermore, each racial group generally had its own school system.

3.2.3 Malaysian Today

The Malays account for 53.4% of the population together with a small group of the other indigenous groups, 11.7% are known as *Bumiputra*, a Malaysian language term which literally means 'sons' or 'princes of soils', which accords them special privileges as enshrined in the Constitution. The Chinese and Indians make up about 26.0% and 7.7% of the population respectively. The remaining 1.2% are others include Malaysians of, inter alia, European and Middle Eastern descent (Department of Statistics, 2004).

Religion is highly correlated with ethnicity and almost all of the major religions of the world have substantial representation in Malaysia. Islam is the most widely professed faith in Malaysia with about 60.4% of the total population made up of Muslims.

Buddhism form 19.2%; Christianity 9.1%; Hinduism 6.3%; Confucianism, Taoism and other traditional Chinese religion 2.6%; folk and Tribal Animistic Religion 1.2% and others including Sikhism, and the Baha'i Faith of the total population (Department of Statistics, 2004).

By constitutional definition, all Malays are Muslim. Article 160 of the Constitution of Malaysia defines Malay as a Malaysian citizen born to a Malaysian citizen, who professes to be a Muslim, habitually speaks the Malay language, adheres to Malay customs, and is domiciled in Malaysia. As a result, Malay citizens who convert out of Islam are no longer considered Malay under the law. The Chinese population in Malaysia is mostly Buddhist, Taoist or Christian. Malaysians of Indian descent encompasses Hindus, Muslims, Sikhs, Christians or Buddhists.

3.3 Research Methodologies

Firstly, we developed a family life-cycle model for Malaysia's three major races – Malays, Chinese and Indians. All major stages of the family life cycle were analysed – unattached, marriage, parenting from babies through adolescents, launching adult children, retirement and senior years.

To begin the revision method formulation, we estimated the person's total income for each year from projection of his current salary over the remaining years of his working lifetime, and income after retirement such as retirement benefits. For married couple, the income for both husband and wife are estimated.

Let,

x = Current age

y = Wife's current age

$I_{h(x+t)}$ = Total income for the husband at age $x+t$

$I_{w(y+t)}$ = Total income for the wife at age $y+t$

$(e_x^{ow})_h$ = Husband's working life expectancy

$(e_y^{ow})_w$ = Wife's working life expectancy

$(EPF \text{ Savings})_{x+(e_x^{ow})_h}$ = Husband's Employee Provident Fund savings on retirement

$(EPF \text{ Savings})_{y+(e_y^{ow})_w}$ = Wife's Employee Provident Fund savings on retirement

V^t = Present value at time t

The present value of the income is as follows,

$PV(I)$ = Present value of income for the husband

+ Present value of income for the wife

$PV(I) = PV(I_h) + PV(I_w)$, where $PV(I_w) = 0$ for single person

Where,

$$PV(I_h) = I_{h(x+0)}V^0 + I_{h(x+1)}V^1 + I_{h(x+2)}V^2 + \dots + I_{h[x+(e_x^{ow})_h-1]}V^{(e_x^{ow})_h-1}$$

$$+ (EPF \text{ Savings})_{x+(e_x^{ow})_h} V^{(e_x^{ow})_h}$$

$$PV(I_h) = \sum_x^{x+(e_x^{ow})_h} I_{h(x+t)} V^t + (EPF \text{ Savings}) V^{(e_x^{ow})_h} \quad t = 0, 1, 2, 3 \dots t < (e_x^{ow})_h$$

And,

$$PV(I_w) = I_{w(y+0)}V^0 + I_{w(y+1)}V^1 + I_{w(y+2)}V^2 + \dots + I_{w[y+(e_y^{ow})_w-1]}V^{(e_y^{ow})_w-1}$$

$$+ (EPF \text{ Savings})_{y+(e_y^{ow})_w} V^{(e_y^{ow})_w}$$

$$PV(I_w) = \sum_y^{y+(e_y^{ow})_w} I_{w(y+t)} V^t + (EPF \text{ Savings}) V^{(e_y^{ow})_w} \quad t = 0, 1, 2, 3 \dots t < (e_y^{ow})_w$$

In this research, we used the monthly income of RM1,000, RM2,500 and RM5,000 in our case studies.

Next, income tax for the person is calculated for each year until retirement age using the existing tax tables and rules produced by the Inland Revenue Department in Malaysia. Again, the present value is then calculated. The analysis of income tax is based on the combined account assessment.

Let,

x = Current age

y = Wife's current age

$T_{(xy+t)}$ = Total tax payable for married couple at age $x+t$ for the husband and at age $y+t$ for the wife

$T_{(x+t)}$ = Total tax payable for a single man before getting married at age $x+t$

$T_{(y+t)}$ = Total tax payable for a single woman before getting married at age $y+t$

(e_{xy}^{ow}) = Working life expectancy for husband or wife whichever occur last

(e_x^{om}) = Age at first marriage for men

(e_y^{om}) = Age at first marriage for women

V^t = Present value at time t

The present value of the total income tax payable for the married couple is,

$$PV(T) = T_{xy+0}V^0 + T_{xy+1}V^1 + T_{xy+2}V^2 + \dots + T_{xy+(e_{xy}^{ow})}V^{(e_{xy}^{ow})}$$

$$= \sum_{xy}^{xy+(e_{xy}^{ow})} T_{(xy+t)}V^t \quad t = 0, 1, 2, 3 \dots t < (e_{xy}^{ow})$$

For single person, the tax payable is estimated for each year until the age at first marriage. Then the analysis continues on the combined account assessment.

For a currently single man,

$$PV(T) = T_{x+0}V^0 + T_{x+1}V^1 + T_{x+2}V^2 + \dots + T_{x+(e_x^{om})_h}V^{(e_x^{om})_h} + \dots + T_{xy+(e_{xy}^{ow})}V^{(e_{xy}^{ow})}$$

For a currently single woman,

$$PV(T) = T_{y+0}V^0 + T_{y+1}V^1 + T_{y+2}V^2 + \dots + T_{yx+(e_y^{om})_w}V^{(e_y^{om})_w} + \dots + T_{xy+(e_{xy}^{ow})}V^{(e_{xy}^{ow})}$$

Then, we estimated the total amount of household expenditures, which are calculated using the data published by the Department of Statistics, Malaysia.

Let,

x = Husband's current age

y = Wife's current age

E_{x+t} = Total expenditure costs at age $x+t$

HEI = Household expenditure Index

$HE_{(xy+t)}$ = Average monthly household expenditure for married couple at age $x+t$ for the husband and at age $y+t$ for the wife

$HE_{(x+t)}$ = Average monthly household expenditure for a single man before getting married at age $x+t$

$HE_{(y+t)}$ = Average monthly household expenditure for a single woman before getting married at age $y+t$

(e_{xy}^o) = Life expectancy of husband or wife whichever occur last

(e_x^{om}) = Age at first marriage for men

(e_y^{om}) = Age at first marriage for women

V^t = Present value at time t

Therefore, the present value of the total household expenditures for the married couple is,

$$PV(E) = E_{xy+0}V^0 + E_{xy+1}V^1 + E_{xy+2}V^2 + \dots + E_{xy+(e_{xy}^o)}V^{(e_{xy}^o)}$$

$$= \sum_{xy}^{xy+(e_{xy}^o)} E_{(xy+t)}V^t \quad t = 0, 1, 2, 3 \dots t < (e_{xy}^o)$$

For a single person, the total household expenditures are estimated for each year until the age at first marriage, then the analysis continues as a married couple and family until the expected age of death for the husband or wife whichever occur last.

For a currently single man,

$$PV(E) = E_{x+0}V^0 + E_{x+1}V^1 + E_{x+2}V^2 + \dots + E_{x+(e_x^{om})_h}V^{(e_x^{om})_h} + \dots + E_{xy+(e_{xy}^o)}V^{(e_{xy}^o)}$$

For a currently single woman,

$$PV(E) = E_{y+0}V^0 + E_{y+1}V^1 + E_{y+2}V^2 + \dots + E_{yx+(e_y^{om})_w}V^{(e_y^{om})_w} + \dots + E_{xy+(e_{xy}^o)}V^{(e_{xy}^o)}$$

Children's education costs are also included in the computations. In addition, other post death needs such as funeral expenses are also incorporated.

Let,

x = Current age

y = Wife's current age

OE = Total of other expenses

b_i = Median age at birth for the i child according to age of mother, where

$$i = 0, 1, 2, \dots, n$$

$(e_x^o)_h$ = Husband's life expectancy

$(e_y^o)_w$ = Wife's life expectancy

V^t = Present value at time t

Therefore, the present value of other expenses is as follows,

$$\begin{aligned} PV(OE) = & \text{(Education cost for the first child)}_{y+b_1} V^{b_1-y} \\ & + \text{(Education cost for the second child)}_{y+b_2} V^{b_2-y} + \dots \\ & + \text{(Education cost for the } n^{\text{th}} \text{ child)}_{y+b_n} V^{b_n-y} \\ & + \text{(Funeral expenses for the husband)}_{x+e_x^o} V^{e_x^o} \\ & + \text{(Funeral expenses for the wife)}_{y+e_y^o} V^{e_y^o} \end{aligned}$$

Then, the present value of net future income flow for the person can be calculated using the equation below,

$$\text{Present Value of Net Future Income} = PV(I_h) + PV(I_w) - PV(T) - PV(ME) - PV(OE)$$

Where, $PV(I_h)$ = Present value of income for the husband

$PV(I_w)$ = Present value of income for the wife

$PV(T)$ = Present value of income tax of the husband and wife

$PV(ME)$ = Present value of household expenditures

$PV(OE)$ = Present value of other expenses

Lastly, in the application of the revision method, we determined the amount of life insurance coverage necessary to maintain the family's current standard of living in terms of multiple of income.

We used the same method and formula discussed above to calculate the wife's income, tax, household expenditures, other expenses and present value of net future income after death of the breadwinner.

Finally, we can estimate the amount of life insurance required for a person in times of current income by using the following formula.

$$\begin{aligned} & (\text{Life Insurance required in times of current income})_x = \\ & \frac{- (\text{Present value of future net income after death of breadwinner}) - (\text{EPF saving at death})}{12 * \text{Current Income}} \end{aligned}$$

3.3.1 Case Studies

Fifty-four family life-cycle models were created for the purpose of this research.

- Single Malay man age 20, 25, 30, 35, 40 and 45.

- Single Chinese man age 20, 25, 30, 35, 40 and 45.
- Single Indian man age 20, 25, 30, 35, 40 and 45.
- Married Malay man age 20, 25, 30, 35, 40 and 45.
- Married Chinese man age 20, 25, 30, 35, 40 and 45.
- Married Indian man age 20, 25, 30, 35, 40 and 45.
- Single Malay woman age 20, 25, 30, 35, 40 and 45.
- Single Chinese woman age 20, 25, 30, 35, 40 and 45.
- Single Indian woman age 20, 25, 30, 35, 40 and 45.

3.4 Data Sources

This sub-section describes the data sources that can be used when developing the Malaysian family life-cycle model.

3.4.1 The 1994 Malaysian Family Life Survey

In developing the Malaysian family life-cycle model in chapter 4, we used the 1994 Malaysian Family Life Survey conducted by the National Family Planning Board of Malaysia. This is the latest data available. The survey was conducted between November 1994 and March 1995 to gather detailed information on nuptiality, childbearing and other aspect of family life.

The survey covered a representative sample of 4,444 married women between the ages of 15 and 49 years.

A variety of social background variables was collected in this survey including ethnic groups, educational background, age at first marriage, age of husband at marriage and information about children.

3.4.2 The 1998/99 Household Expenditure Survey

In Malaysia, household-spending data is hard to come by. One of the publicly available sources of information on household spending patterns is the Household Expenditure Survey conducted by the Department of Statistics. We used this data in estimating the household expenditures in chapter 6 and 7.

The Household Expenditure Survey has been conducted periodically since 1974 with the latest being in 1998/99. Data on expenditure was collected by the method of direct interview by the field officers of the Department of Statistics. The duration of the survey was twelve-month beginning in July 1998 and ending in June 1999. Different samples were canvassed for every month. Spreading the survey over twelve months ensured that seasonal variations in expenditure on account of various festivals during the year and also commencement of school terms were taken into consideration. There were about 10,000 private households interviewed in the survey.

The consumption expenditure items were classified into nine main groups according to a United Nations System of National Accounts (SNA) revised 1968, as follows:

1. Food
2. Beverages and tobacco
3. Clothing and footwear
4. Gross rent, fuel and power

5. Furniture, furnishings and household equipment and operation
6. Medical care and health expenses
7. Transport and communication
8. Recreation, entertainment, education and cultural services
9. Miscellaneous goods and services

Chapter 4

Malaysian Family Formation and the Life Cycle

The Chapter discusses members of Malaysian family formation and development. It will range from marriage to divorce and family violence. Chapter objectives:

The family life cycle is a term to refer to the sequence of stages through which a typical family passes during its lifetime. Concepts of family development stages were first introduced by Carter and McGoldrick (1999) who defined the stages of the family life cycle as the distinct stages which the family system passes through with some degree of the family with adjustment, learning, change and growth. The family life cycle is a process.

Chapter 4

Malaysian Family Formation and the Life Cycle

The Chapter provides an overview of Malaysian family formation and the development of the family life cycle model for three major races in Malaysia namely Malays, Chinese and Indians.

The family life cycle is a term in reference to the succession of stages through which a typical family passes during its life span. Generally, a family has to go through major stages within a life cycle. Carter and McGoldrick (1989) have defined six stages of the family life cycle – the unattached young adult, the newly married couple, the family with young children, the family with adolescents, launching children and finally the family in the later years

4.1 Marriages in Malaysia

Changes in demographic patterns and the economy over the last several decades have significantly affected Malaysian families. In the past, Malaysian generally marry at an early age (under 20 years) especially among women (Von Elm and Hirschman, 1979), with the mean age at marriage about 17.5 years for Malay and Indian women in 1947. Chinese women, even in 1947, tended to marry later with a mean above 20 years of age (Hirschman, 1980).

Marriage in the traditional system was usually arranged by parents or elderly persons in the family and love was not a consideration for marriage. There was also strong pressure for a woman to marry and if she remains unmarried at age 20 she will be regarded as an *old maid*. The main role of women in the family then was centred around childbirth, child rearing and housekeeping.

Due to the process of modernisation and high achievement in education, more women are entering the labour force and hence, the age at first marriage has increased (Kok, 1982). These have brought changes in the role of women who has to be a wife, a mother and a working person. The life styles for most women have changed which have moved from arranged marriages and late marriages become a norm and this is now accepted by the community.

The sharp increased in age at first marriage has been a major cause of fertility decline (Jones, 1980). The different races group also have undergone different pace of fertility transition (Tey, 2002)

In addition to modernisation, there are other influential factors affecting the pattern of age at marriage. In Malaysia, there are strong associations between age at first marriage and the ethnic background (Von Elm and Hirschman, 1979; Jones, 1980; Kok, 1982).

Since the early 1970s, social interaction between the three dominant ethnic groups has gradually increased, but inter-marriage across races group in Malaysia is very rare, (Leete, 1996). As such, marriage traditions and rituals; and family life among the different races groups have also remained distinct, reflecting the cultural and religious heritage of each of the races groups (Subramaniam, 1997).

Therefore, in this research we ignored the possibility of inter-marriage across races, and only focus on the marriage and family formation patterns among the three distinct races groups in Malaysia – Malays, Chinese and Indians.

4.1.1 Age at First Marriage

The Population and Census 2002 data from the Department of Statistics show that Malaysians are marrying later. For never married men and women, the Singulate Mean Age at First Marriage in 2000 was 28.6 and 25.1 years old respectively, increased from 25.6 for men and 22.1 for women in 1970 (Rabieyah and Roszaini, 2002).

Since the data on marriages and fertility was limited in the Population Census 2002, for instance there was no topic canvassed on the age at first marriage⁷ and number of

⁷ The population and housing census 2002 did not ask a direct question on age at first marriage. Therefore, a proxy measure, the Singulate Mean Age at Marriage (SMAM) was computed using the proportions 'never married' at the various age groups. This measure establishes the average duration of time that men and women in a given population spend in the 'never married' status. The measure therefore gives an approximate age at first marriage.

children born, therefore we used the 1994 Malaysian Family Life Survey data in this research. The survey was conducted by the National Family Planning Board of Malaysia. This is the latest data available.

There are fifty-four family life cycle models in this research that include married couple age 20, 25, 30, 35, 40 and 45 for Malays, Chinese and Indians. We assumed these couple got married at the age of the calculated median age at first marriages as in table 4.1.

Table 4.1: Median Age at First Marriage by Race for Men and Women in Malaysia

Race	Sex	
	Men	Women
Malay	24.4	19.8
Chinese	25.5	22.2
Indian	25.3	20.4

Note: Calculated by the indirect method using linear interpolation. See Shryock, H.S. and Siegel, J.S., the Methods and Materials of Demography, p. 292-293.

Source: Population and Family Development Board, Malaysia, 1994.

The table shows that the median age at first marriage is highest among the Chinese compared to Malays and Indians for both men and women.

4.1.2 Expected Age at First Marriage

To estimate the timing of first marriage in the life cycle for a single man and woman, we constructed nuptiality tables for three major races in Malaysia.

The 1994 Malaysian Family Life Survey data is the primary source used in preparing the nuptiality tables in this research (see Appendix 2). The results of the nuptiality table may be considered as a projection of the age at first marriage for single men and women in Malaysia.

Table 4.2: Expected Age at First Marriage by Race for Men and Women in Malaysia

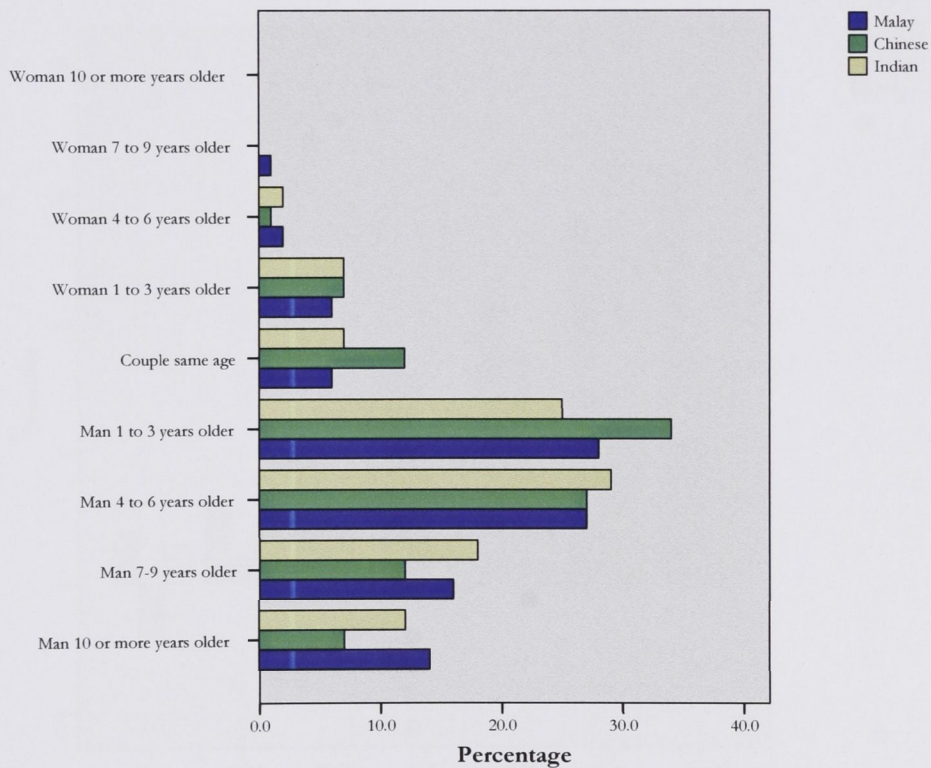
Current Age	Expected Age at First Marriage					
	Men			Women		
	Malays	Chinese	Indians	Malays	Chinese	Indians
16	-	-	-	21.8	24.8	22.4
17	-	-	-	22.3	24.8	22.9
18	25.8	28.6	26.7	22.8	24.8	23.6
19	26.0	28.7	26.9	23.4	24.8	24.2
20	26.3	28.8	26.9	24.2	24.8	24.6
21	26.7	29.0	27.6	25.0	25.9	25.8
22	27.2	29.3	28.0	26.0	26.6	26.6
23	27.7	29.6	28.5	27.0	27.5	27.4
24	28.5	30.1	29.1	28.3	28.5	28.3
25	29.5	30.7	29.9	30.1	30.7	30.6
26	30.6	31.7	30.9	32.4	31.3	30.9
27	31.9	32.7	32.0	34.8	33.7	32.5
28	33.4	33.8	33.3	36.8	36.7	34.2
29	35.1	35.0	34.6	38.8	38.8	35.9
30	37.0	36.2	35.8	40.6	40.9	37.5
31	38.9	37.4	37.2	42.3	42.8	39.5
32	40.5	38.6	38.4	43.1	44.3	41.6
33	41.9	40.3	39.6	44.4	45.9	43.5
34	42.9	42.4	40.7	45.6	46.2	45.7
35	43.6	43.7	42.0	46.4	46.9	46.2
36	44.5	44.9	43.0	47.2	47.9	48.4
37	45.3	46.0	44.0	47.9	48.3	48.8
38	46.1	47.0	44.8	48.4	48.7	48.8
39	46.9	47.7	45.7	48.7	49.0	48.8
40	48.0	48.2	47.0	49.0	49.2	49.0
41	48.4	48.8	47.7	49.2	49.4	49.1
42	48.8	49.1	48.0	49.3	49.4	49.4
43	49.1	49.2	48.3	49.4	49.4	49.4
44	49.4	49.3	48.7	49.5	49.5	49.5
45	49.5	49.4	49.2	49.5	49.5	49.5
46	49.7	49.5	49.4	49.5	49.5	49.5
47	49.8	49.5	49.4	49.5	49.5	49.5
48	49.9	49.5	49.5	49.5	49.5	49.5

According to the Islamic Family Law⁸ in each state in Malaysia and the Law Reform (Marriage and Divorce) Act 1976 for non-Muslim, the minimum age at first marriage for women is 16 years old and for men it is 18 years old, with provision for judicial permission for underage marriage. For this reason, the calculation of the expected age at first marriage starts from age 16 for women and 18 for men.

4.1.3 Median Age Gap at First Marriage

Figure 4.1 shows that in 1994, typically marriages where the man was 1-3 years older made up over quarter of all marriages entered into.

Figure 4.1: Distribution of Grouped Differences in Age at First Marriage by Races



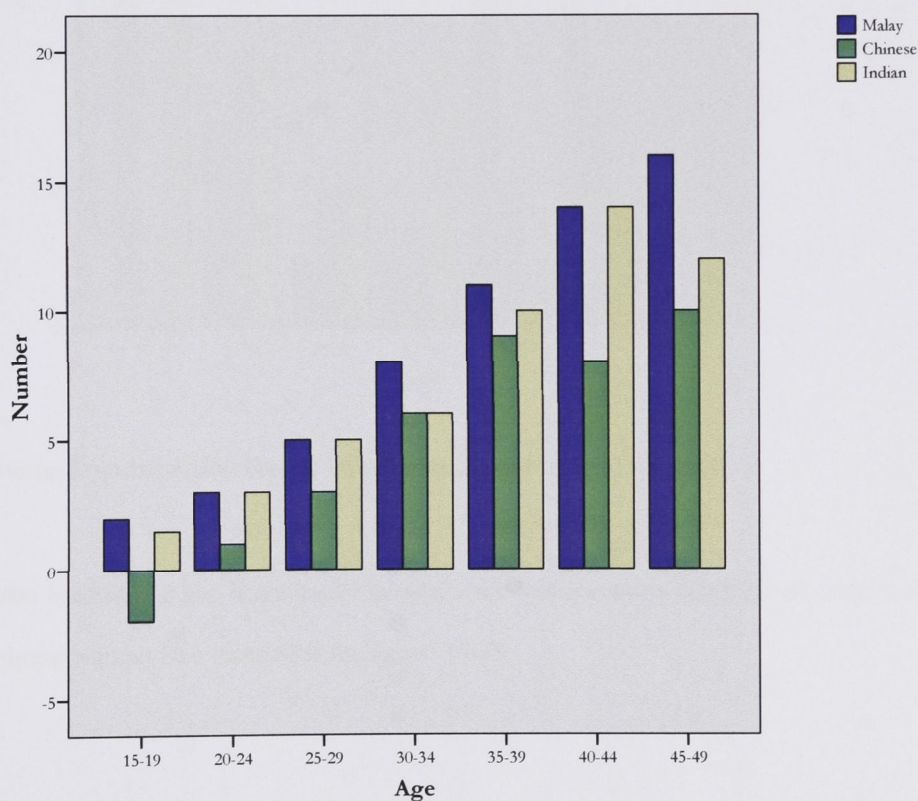
Source: Population and Family Development Board, Malaysia, 1994.

⁸ Islamic laws fall under the jurisdiction of the individual states in Malaysia.

The percentage of marriages where the man and woman were the same age are 6.3% for Malays, 11.8% for Chinese and 7.1% for Indians. Overall, marriages for all races where the man was older than the woman accounted for 83.2% (with 85.5% for Malays, 80% for Chinese and 84% for Indians); whilst the women were older than the men is only around 8.7% (with 8.9% for Malays, 8.2% for Chinese and 8.9% for Indians) of the cases, where the age difference was only 1-3 years.

Median provides a convenient way to summarise the location of the distribution of age gap at first marriage for men and women. Figure 4.2 shows that the age gap between a man and his wife increases with the increasing age of man.

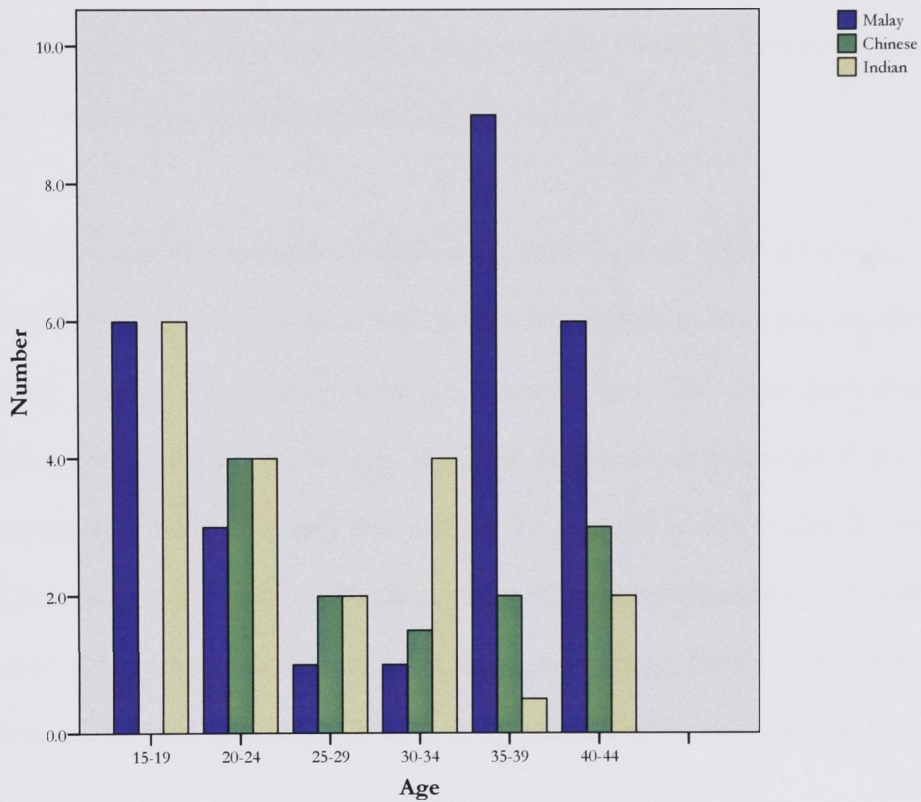
Figure 4.2: Median Age Gap at First Marriage by Age Group of Men by Races



Source: Population and Family Development Board, Malaysia, 1994.

Women tend to be younger than their husbands with median age gap tending to decline as the age of the woman increases (Figure 4.3). However, the age gap increases substantially to 9 years for Malay women who married at the age of 35-39 years old, and later declined by 3 years for the age group of 40-44.

Figure 4.3: Median Age Gap at First Marriage by Age Group of Women by Races



Source: Population and Family Development Board, Malaysia, 1994.

Note: Median age gap is computed as man's age minus woman age for each couple. No data for Chinese women who married at the age of 15-19.

For Chinese women, there was a slight increase in the age gap after reaching the lowest median age gap of 1.5 years for women who marry at the age of 30-34.

The pattern was somewhat different for Indian woman where the median age gap increases to 4 years for age group of 30-34 and later declines to 0.5 years. The median age gap increases again to 2 years for woman who marry at the age of 40-44.

4.1.4 Polygamy

Following the introduction of the Law Reform (Marriage and Divorce) Act 1976 that was enforced in 1982, a non-Muslim man is legally forbidden to marry more than one wife. However, polygamy is allowed among Muslim.

A Muslim man is permitted to marry more than one wife up to a maximum of four, provided he is able to treat his wives equally. Any husband who wants to marry another woman requires the permission of the Syariah Court. The Court shall summon the applicant and his existing wife or wives to be present to determine if the proposed marriage is just and necessary and whether the husband is able to treat the wives with justice and give adequate maintenance to the wives and dependants. The husband must ensure that the new marriage will not endanger or cause harm to the present wife or wives and will not adversely affect the living standard of the existing wife or wives.

Data from the Department of Islamic Development Malaysia (2003) showed that only 1,631 Muslim men have entered into polygamous marriages in 1995; 1,799 Muslim men in 2000 and 1,437 Muslim men in 2003. Since polygamy is relatively low in Malaysia, therefore it is not included in the analysis.

4.2 Divorce and Marital Stability

Statistics on divorce in Malaysia are collected by the Department of Religious Affairs for Muslim and the Department of National Registration for non-Muslim. There are no statistics on divorces available from the Department of Statistics Malaysia.

4.2.1 Divorce Trends in Malaysia

Divorce rates are low in Malaysia. In 2000, only 0.4% of the male population and 1.3% of the female population in Malaysia were currently divorced (Department of Statistics, 2004). This might be indicative of marriage stability in Malaysia. Figure 4.4 and 4.5 illustrates the stable pattern in the proportion of married men and women over the last 3 decades.

Figure 4.4: Marital Status of Men for Year 1970, 1980, 1991 and 2000

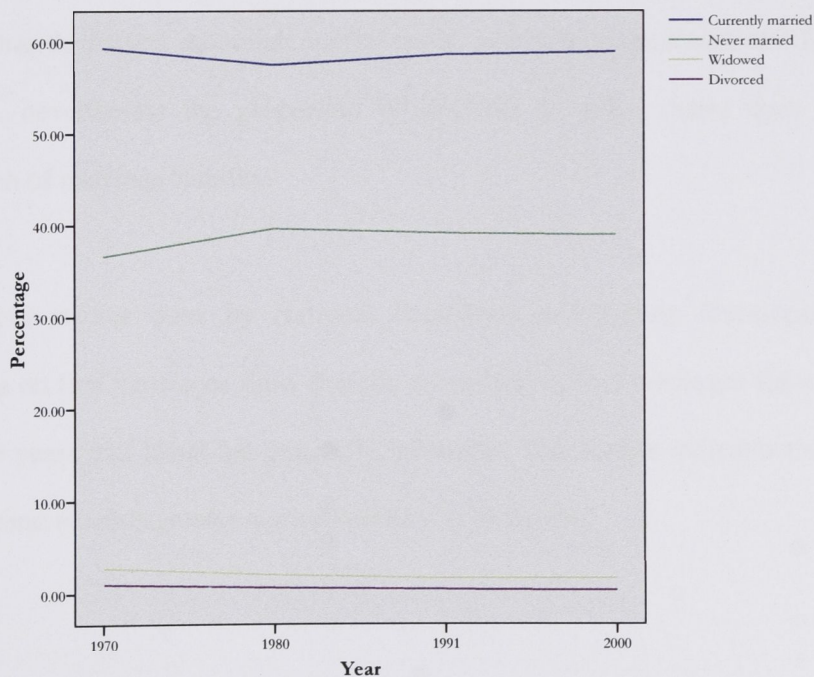
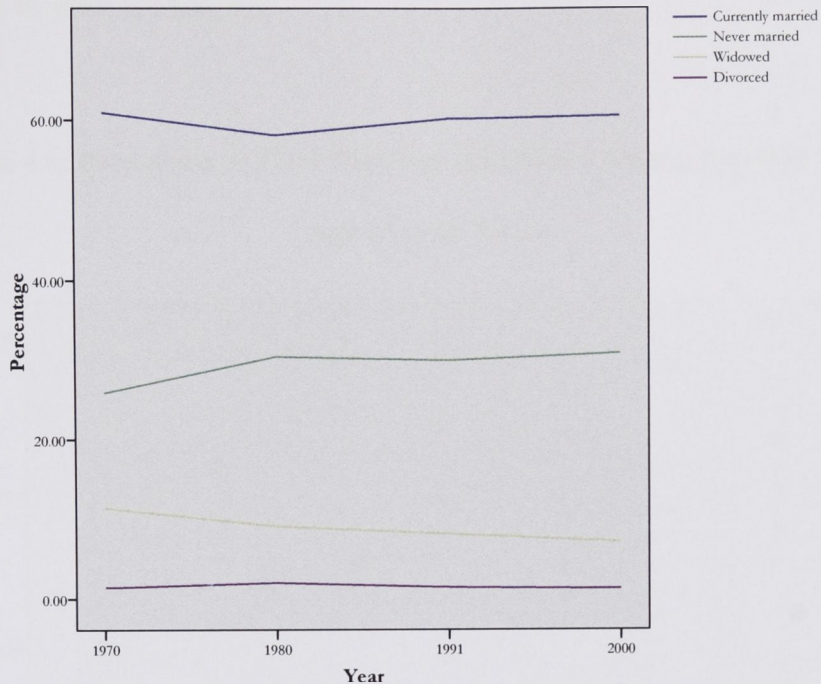


Figure 4.5: Marital Status of Women for Year 1970, 1980, 1991 and 2000



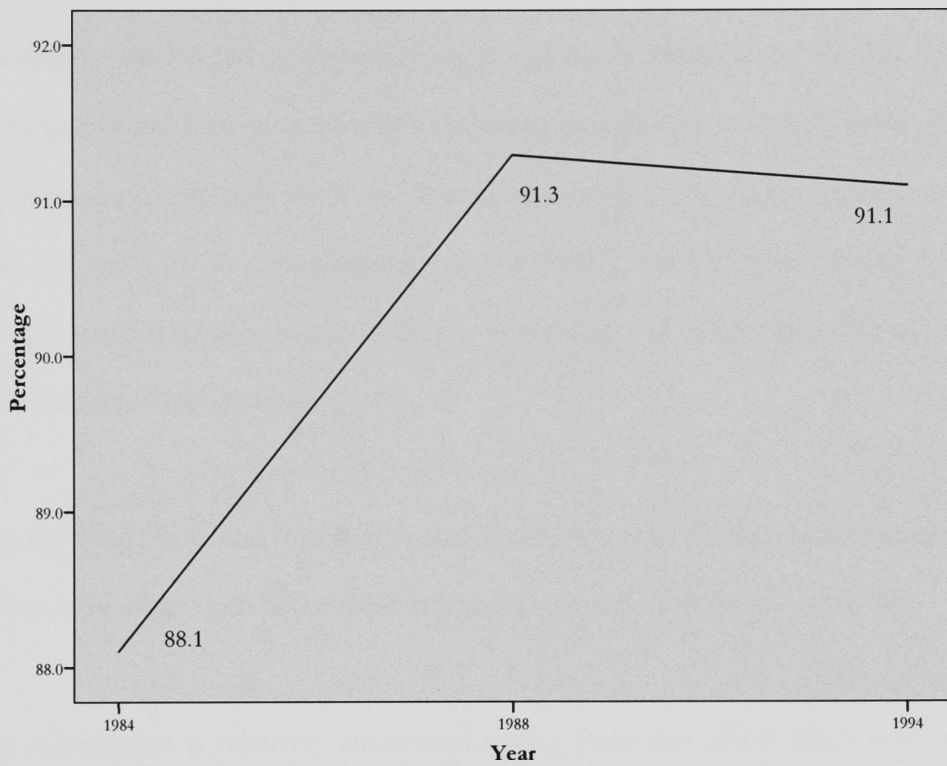
Source: Yearbook of Statistics, Department of Statistics Malaysia, 2004.

The data on marital status from the census (figure 4.4 and 4.5) has shown the rate of divorce has decreased. Although marital status cannot be a good indicator for marriage stability, nevertheless the proportion of divorces to some extent does give some indication of marriage stability.

Data from studies done by National Population and Family Development Board Malaysia on first marriages show that the proportion of first marriages for women aged 16 to 49 years still intact has generally increased. This further indicates that there has been a trend towards greater marital stability in Malaysia.

Figure 4.6 illustrates the proportion of first marriage still intact among married women age 16 to 49 years in Malaysia.

**Figure 4.6: Proportion of First Marriage Still Intact Among Married Women
Age 16 to 49 Years**



Source: National Population and Family Development Board Malaysia, 1994.

4.2.2 Marriage Stability

If marital dissolution is any indication of the stability of the Malaysian family structure, the majority of Malaysian families tend to be stable. Furthermore, since the percentage of divorce among Malaysian is considered small, therefore divorce and separation is not included in the analysis.

4.3 Fertility

From the late 1950s, fertility began to decline, slowly at first, then more rapidly during the 1960s and early 1970s. The fall was primarily due to a rising age at first marriage, increased education attainment, urbanisation and female labour force participation.

Government policies had an important impact on the evolution of differential fertility desires among the three main races (Govindasamy and DaVanzo, 1992). Fertility levels of Malays are higher than those of Chinese and Indians. The Malays tend to marry earlier and rarely use modern contraception (Tey, 2002). Their relatively higher fertility may also result from government subsidies in the forms of scholarships, which lessen the maintenance cost of children.

Using the 1994 Malaysian Family Life Survey data, we estimated the median number of children born of the three major races in Malaysia as well as the timing of births.

Since cohabitation is relatively uncommon among Malaysian and children born out of wedlock is rather small (Tey, 2002), therefore our analysis of the childbearing will be associated with age at first marriage.

4.3.1 Median Number of Children Ever Born

Childbearing outside of wedlock is negligible in Malaysia and hence age at marriage is a very important intermediate variable in affecting the level of fertility of women who marry at different ages (Tey, 2002).

The 1994 Malaysian Family Life Survey shows that Malay women who marry at the age of 16 and 17 have a median of five children; and four children when marry at the age of 18 and 19. Malay women who marry by age 20 to 23 have a median of three children; two children when marry by age 24 and before reaching age 35; one child when marry at the age 36 and 37; and childless when marry at the age of 38 and older.

For Chinese women who marry before reaching age 23 have a median of three children while women who marry by age 24 to 32 have a median of two children. Chinese women who married at the age 33 and 34 have a median of one child and childless when marry at the age 35 and older.

Indian women who marry at the age of 16 and 17 have a median of four children; three children when marry by age 18 to 22; and two children for those who marry at the age of 23 and before reaching age 33. Indian women who marry by age 34 to 36 have a median of one child and those who marry at the age of 37 and older remain childless.

4.3.2 Timing of Births

We used the 1994 Malaysian Family Life Survey to estimate the median duration between marriage and first birth, and the median duration of birth intervals.

For all races, the median duration between marriage and first birth is 1 year. The median duration of second birth is 3 years for Malays and Indians, while the median is 3.5 years for Chinese. The birth interval for third birth is longer for Malays and Chinese, which is 6 years, while only 5 years for Indians.

We summarised the timing of births according to age of mother by races in Malaysia as shown in table 4.3 and 4.4.

For married couples, we assumed these couples get married at the age as in table 4.1. As discussed in sub-section 4.3.1, Malay and Indian women who married at the age of 20 have a median of three children. Similarly, Chinese women who married at the age of 22 also have a median of three children.

As shown in table 4.3, for all races, the first birth is after 1 year of marriage. The second birth is after 3 years of marriage for Malays and Indians, while the duration is 3.5 years for Chinese. The third birth is after 5 years of marriage for Indians and 6 years for Chinese, whereas the duration is longer for Malays, which is 7 years.

Table 4.3: Median Age at Birth according to Age of Mother by Races in Malaysia

Births	Race		
	Malay	Chinese	Indian
Median age of Mother			
Age at marriage	19.8	22.2	20.4
First birth	20.3	23.2	21.4
Second birth	22.3	25.7	23.3
Third birth	26.3	28.2	25.4

For a single man and woman, we estimated the expected age at first marriage as shown in table 4.2. To estimate the timing of births, we used the data and constructed a distribution of number of children born according to age of mother as shown in table 4.4.

Table 4.4: Distribution of Number of Children Born According to Age

of Mother by Races

Age of Marriage	Malays					Chinese			Indians			
	1	2	3	4	5	1	2	3	1	2	3	4
16	22.8	24.8	27.8	29.8	32.8	25.8	28.3	30.8	23.4	25.4	27.4	30.9
17	23.3	25.3	28.3	30.3	33.3	25.8	28.3	30.8	23.9	25.9	27.9	31.4
18	23.8	25.8	28.8	30.8	-	25.8	28.3	30.8	24.6	26.6	28.6	-
19	24.4	26.4	29.4	31.4	-	25.8	28.3	30.8	25.2	27.2	29.2	-
20	25.2	27.2	30.2	-	-	26.2	28.7	31.2	26.0	28.0	30.0	-
21	26.0	28.0	31.0	-	-	26.9	28.4	31.9	26.8	28.8	30.8	-
22	27.0	29.0	32.0	-	-	27.6	30.1	32.6	27.6	29.6	31.6	-
23	28.0	30.0	33.0	-	-	28.5	31.0	33.5	28.4	30.4	-	-
24	29.3	31.3	-	-	-	29.5	32.0	-	29.3	31.3	-	-
25	31.1	33.1	-	-	-	30.7	33.2	-	30.6	32.6	-	-
26	33.4	35.4	-	-	-	32.3	34.8	-	31.9	33.9	-	-
27	35.8	37.8	-	-	-	34.7	37.2	-	33.5	35.5	-	-
28	37.8	39.8	-	-	-	37.7	40.2	-	35.2	37.2	-	-
29	39.8	41.8	-	-	-	39.8	42.3	-	36.9	38.9	-	-
30	41.6	43.6	-	-	-	41.9	44.4	-	38.5	40.5	-	-
31	43.3	45.3	-	-	-	43.8	46.3	-	40.5	42.5	-	-
32	44.1	-	-	-	-	45.3	-	-	42.6	44.6	-	-
33	45.4	-	-	-	-	46.9	-	-	44.5	46.5	-	-
34	46.6	-	-	-	-	48.1	-	-	46.7	-	-	-
35	47.4	-	-	-	-	-	-	-	48.2	-	-	-
36	48.2	-	-	-	-	-	-	-	-	-	-	-

Source: National Population and Family Development Board Malaysia, 1994.

4.3.3 Child Rearing and Education

Child rearing is the process of raising and educating a child from birth until adulthood.

It is defined as the period between the birth of the first child to the completion of the tertiary education of the last child.

Education in Malaysia takes place in several stages – pre-school, primary education, secondary education, tertiary education and postgraduate.

Attendance in a pre-school is not universal and generally only affluent families can afford to send their children to pre-schools, which are provided by private operators.

Compulsory education in Malaysia begins at the primary schooling level. Under Section 29 of the Education Act 1996, parents are obligated to ensure that their children receive primary education starting from age six and remain in primary school for the duration of the compulsory education of six years.

The starting age of secondary education is usually at the age of twelve, which consists of five years of schooling referred to as form one to form five. At the end of form five, students are required to take the Sijil Pelajaran Malaysia (Malaysian Certificate of Education) examination before graduating from secondary school.

After the Sijil Pelajaran Malaysia (Malaysian Certificate of Education) examination, students would have a choice of either studying in form six or the matriculation programme. Should they choose to continue studying in form six, they will also take the Sijil Tinggi Persekolahan Malaysia (Malaysian Higher School Certificate) examination. Additionally, students may apply for admission to the matriculation programme, which is a one or two-year programme run by the Ministry of Education. Some students undertake their pre-university studies in private colleges. They may opt for programmes such as the British 'A' Levels programme, the Canadian matriculation programme, the International Baccalaureate Diploma programme, the American High School Diploma and the Australian matriculation programme.

Further education is also provided by the government to students after finishing secondary school, for instance polytechnics, vocational education and training, and teacher's colleges which provide certificate and diploma courses.

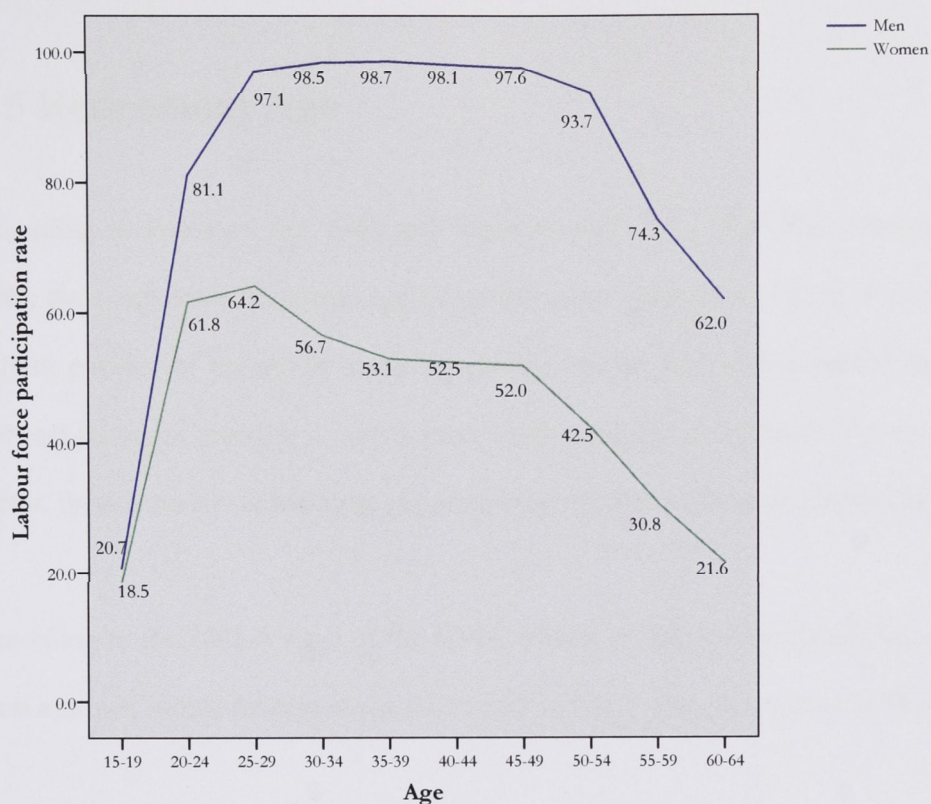
Generally, students enter University from age nineteen onwards and study for an academic degree normally for three years. To estimate schooling levels at particular ages, we assumed that children began formal schooling at age six and progressed normally through their education until finishing tertiary education at the age of twenty-two.

4.4 Women in Labour Force

While women account for nearly half of the working age population, their participation rate is relatively low at 47.7% in 2003 (Department of Statistics Malaysia, 2004). The labour force participation rate for men is consistently over 80% since 1980 with 82.1% in 2003 (Department of Statistics Malaysia, 2004).

Figure 4.7 shows the labour force participation rates by gender and age group in Malaysia.

Figure 4.7: Labour Force Participation Rates by Age Group for Men and Women
in Malaysia for the Year 2003



Source: Department of Statistics Malaysia, 2004.

Despite the higher percentage of women in the universities and increased employment opportunity, the socio-cultural values in Malaysia still relate women primarily with family, marriage and children (Yun, 1984). This can be seen in figure 4.7, where the labour participation by women was more than 60% in their younger age but in their 30s, they drop out of the labour force. This may affect married women with young children where they leave their jobs after childbirth. The United Nations Economic and Social Commission for Asia and the Pacific (2007) report said that the tendency for a sizeable proportion of women to stop work after they have their first birth, and not return once

their child bearing is complete, has been a feature of Malaysia's labour market, and this pattern holds for each of the ethnic communities (Leete, 2005).

4.5 Retirement Age

According to Pensions Act 1980 and Statutory and Local Authorities Pensions Act 1980, the compulsory retirement age for public sector employees is at 56. However, the current practice of the public sector is rehiring capable and willing retired staff on a contract basis, for example to partly meet teacher and nurse shortages. For the private sector, there is no law in Malaysia requiring employees to retire at any particular age.

According to the 2005-6 wave of the HSBC Future of Retirement Global Survey⁹, the ideal age men should retire is at age 60.2 years and 56.2 years for women in Malaysia.

4.6 Life Expectancy

In this research, we used the life expectancy table for men and women in Malaysia produced by United Nations World Health Organization.

Table 4.5 shows the life expectancy by sex in Malaysia for the year 2004.

⁹ HSBC Future of Retirement Global Survey report written in conjunction with the Oxford Institute of Ageing, part of Oxford University's Social Sciences Division. The survey involved around 21,000 persons aged 18 years and over in 20 countries across five continents.

Table 4.5: Life Expectancy by Sex in Malaysia for the Year 2004

Age Range	Men	Women
< 1	69.3	74.2
1 – 4	69.1	73.9
5 – 9	65.3	70.0
10 – 14	60.4	65.1
15 – 19	55.5	60.2
20 – 24	50.9	55.4
25 – 29	46.3	50.5
30 – 34	41.7	45.7
35 – 39	37.2	40.8
40 – 44	32.8	36.1
45 – 49	28.4	31.4
50 – 54	24.2	26.8
55 – 59	20.2	22.5
60 – 64	16.5	18.4
65 – 69	13.4	14.7
70 – 74	10.7	11.5
75 – 79	8.4	8.5
80 – 84	7.3	6.7
85 – 89	6.0	5.1
90 – 94	4.6	3.8
95 – 99	3.3	2.7
> 100	2.3	2.0

Source: United Nations World Health Organization.

4.7 Malaysian Family Life-Cycle – An example

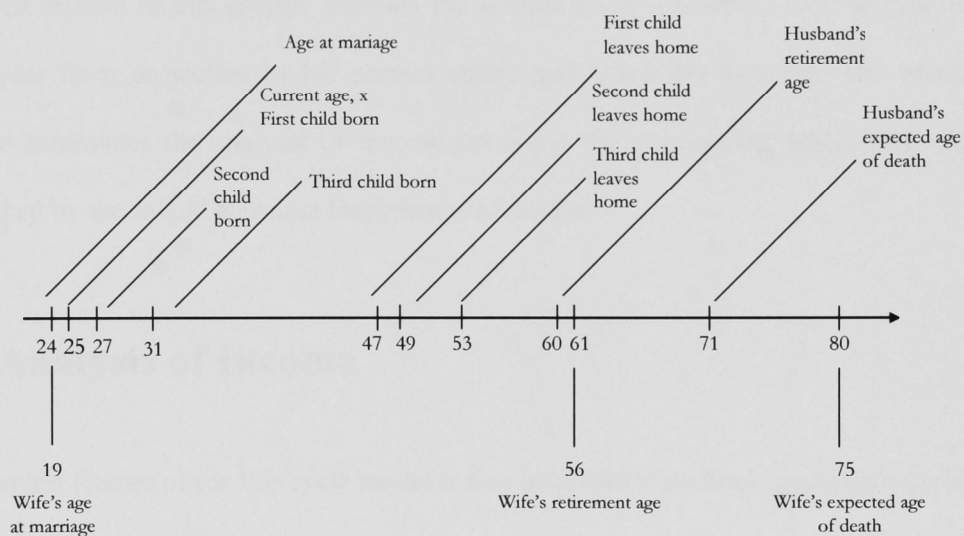
Figure 4.8 shows the example of a family life-cycle for a single Malay man age 25. We assume a married Malay man age 25 and his spouse were married when he was 24 and the wife was 19 years old.

The married couple are expected to have three children – the first child born after 1 year of marriage, while second and third child born after 3 and 7 years of marriage respectively.

We assume that children progressed normally through their education until finishing tertiary education at the age of 22. Therefore, we assume that the first, second and third child would be finishing their tertiary education by father's age of 47, 49 and 53 years respectively.

The person is expected to retire at the age of 60 and lives until the age of 71, while his wife is expected to retire at the age of 56 and dies at the age of 75.

Figure 4.8: Family Life-Cycle for a Married Malay man age 25



Note: The model is based on the person's age at last birthday.

Chapter 5

Analysis of Income and Taxes

The first section in this chapter presents the estimation of a person's total income for each year from projection of his current salary and retirement benefits. The second section formulates the analysis of income tax using the existing tax tables and rules published by the Inland Revenue Department Malaysia.

5.1 Analysis of Income

The central feature of the life-cycle model is that individuals are born, work for a period of time, retire and die. During their working lifetime, a person has to save for retirement. This type of model has a long tradition since the original work of Ando and Modigliani (1963).

5.1.1 Salary

The basic remuneration of an employee in any organisation is a salary or wages. A salary is a form of periodic payment from an employer to an employee, which is specified in an employment contract.

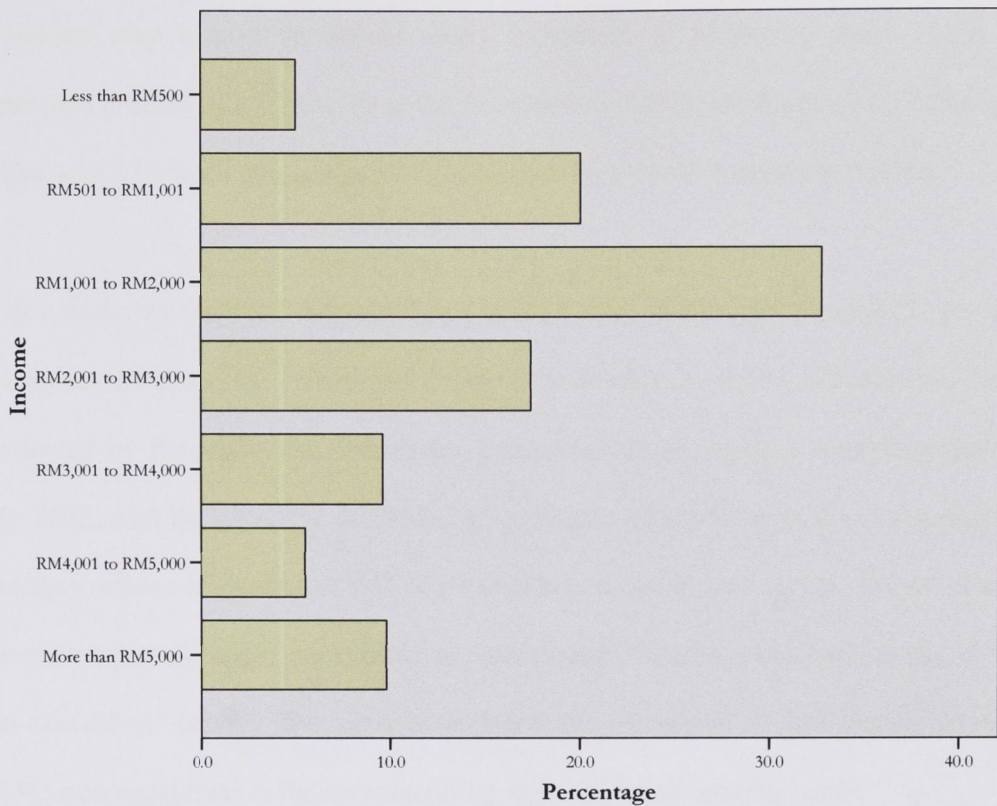
In this research, we used the monthly income of RM1,000, RM2,500, and RM5,000 in our case studies.

The mean monthly household income for the year 1999 was RM2,472 with the highest percentage of Malaysian households earned between RM1,001 to RM2,000 a month (Department of Statistics, 1999b). Therefore, we chose income level of RM1,000 and RM2,5000 in this research to represent the highest income level group earned by Malaysian households and the mean monthly household income.

We also included in this research the monthly salary of RM5,000 to represent the upper-income group households. There were 5.5% of households with monthly income between RM4,001 to RM5,000; while 9.8% of households earned more than RM5,000 (Department of Statistics, 1999b).

Figure 5.1 shows the Malaysian household income distribution for the year 1999.

Figure 5.1: Malaysian Household Income Distribution for the Year 1999



Source: 1999 Household Income Survey, Department of Statistics Malaysia, 2001.

5.1.2 Women's Salary

Women representation in Malaysia's labour force is low. In addition, most women who participate in the labour force fill lower positions, which in turn generates lower income (Lee and Nagaraj, 1995). It was recorded in 'Human Development Report 2005' by United Nations Development Programmes (UNDP) that in 2003 Malaysian women earned only 47.2% of the income earned by men.

5.1.3 Salary Increment

A worker may receive an annual salary increment. In Malaysia, about 73.1% of employers granted salary increase to their executives (Malaysian Employers Federation, 2003a) and 77.1% for non-executives (Malaysian Employers Federation, 2003b).

In this study, we used the data published in the Salary and Fringe Benefits Survey for Executives 2002 and the Salary and Fringe Benefits Survey for Non-Executives 2002 conducted by the Malaysian Employers Federation. These surveys were launched in July 2002, with the objective of obtaining up-to-date information on the compensation packages offered to executives and non-executives in the private sector. A total of 312 companies participated in the executives' survey and 310 companies participated in the non-executives' survey. The surveys analysed the salaries of 17,249 executives and 82,385 non-executives in the manufacturing and non-manufacturing sector.

The average salary increase in 2003 was 6.05% for the executives (Malaysian Employers Federation, 2003a). For the non-executives, the salary increase was slightly lower at 5.89% (Malaysian Employees Federation, 2003b). Table 5.1 shows the average basic salary and salary increase for different levels of executives in year 2002.

Table 5.1: Average Basic Salary and Salary Increase for Executives, 2002

Categories of Executives	Average Basic Monthly Salary (RM)	Average Salary Increase (%)
Top Executives	14,434	6.5
Senior Managers	9,066	5.9
Managers	6,055	6.0
Assistant Managers	4,076	6.0
Senior Executives	3,325	5.9
Executives	3,446	6.1

Source: MEF Salary and Fringe Benefits Survey for Executives 2002 in the Private Sector

Therefore, in this research we assume a constant future salary increment rate at 6% per annum.

5.1.4 Promotional Increases

For most individuals, the most common progression is that a person is hired and through a combination of experience, education and opportunity, he receives promotions that encompass additional responsibility and salary increase, which is known as promotional increase (Young, 2003).

Job seniority and length of employment are important criteria for job promotion. Job seniority is thought to be a proxy for experience, knowledge and perhaps productivity as implied in the learning-curve theory¹⁰ (Chase and Aquilano, 1981). Carmichael (1983) also showed that a promotion ladder, whereby jobs are assigned by seniority and wages are attached to jobs, can produce efficient turnover behaviour. Pancratz (2001) stated that an employee who has given many years of dedicated service in the company should be given top consideration for promotion based on their loyalty.

In this research, we assumed the promotion depends upon the job seniority or his length of service in the company. For instance, a person might move to another company, but he is still considered senior in that particular job (job seniority); or after a long stint in the same company, the person would have better chances for promotion (length of service).

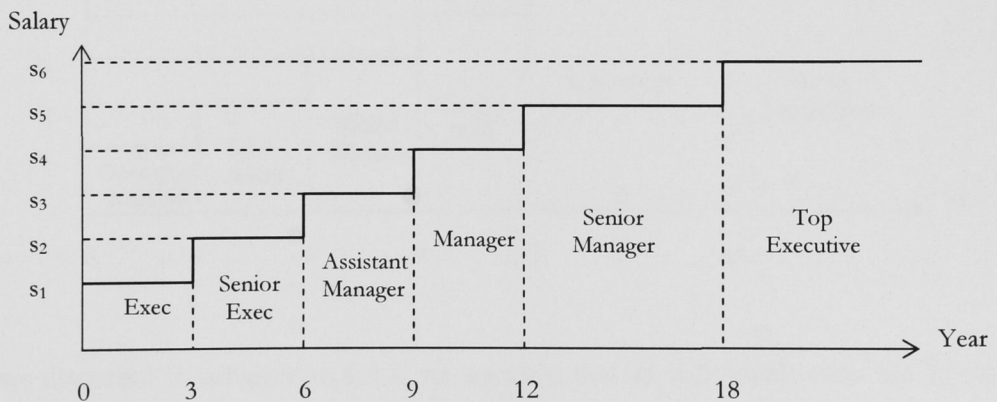
¹⁰ The learning curve refers to a relationship between the duration of learning or experience and the resulting progress, initially introduced in the cognitive psychology. As individuals get more experienced at a task, they usually become more efficient at them.

Cobb-Clark and Dunlop (1999) studied the job promotion patterns including the relationship between promotions and the tenure a worker has with his employer, using the data from the National Longitudinal Survey of Youth. The research focuses on the promotion opportunities of men and women aged 25 to 32 as they move from being relatively inexperienced workers into their prime working ages. From the research, they found that majority of employees (46.7%) were promoted after 3 years of tenure with the employer.

The timing of a promotion for managers and above is longer. In the United States, a middle manager remains on the same job for 6.3 years on average before being promoted to senior management (Gerencher, 2005).

We assumed the promotion pattern would be similar in Malaysia. For senior managers and below, we assumed the average promotion tenure is three years and six years for senior managers and above. Using the Malaysian Employees Federation's job categories as in table 5.1, we developed a job promotions structure as illustrated in figure 5.2.

Figure 5.2: Job Promotions Structure

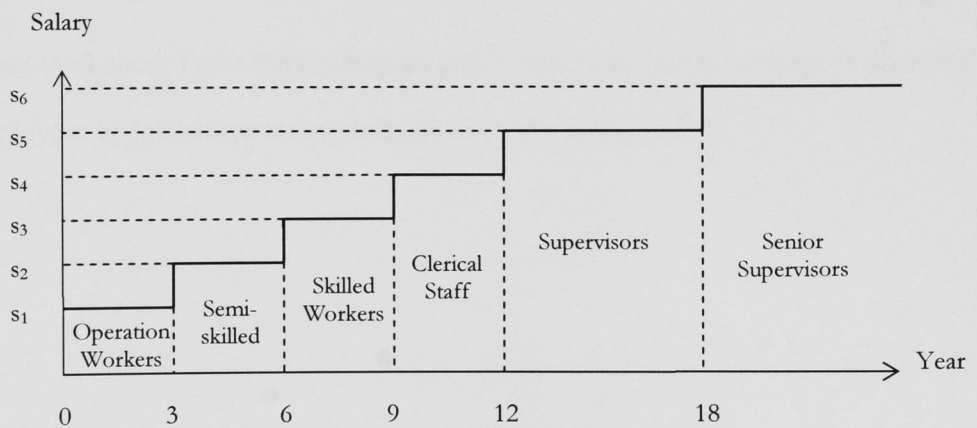


An employee is paid the salary, s_1 when he joins the company and s_2 after he receives a promotion as a senior executive and earns $s_1 + p$. We assumed the promotion depends on the employee's seniority and he receives the next promotion after three years to the assistant manager position and later to manager and senior manager. He is expected to stay on the senior manager position for six years before being promoted to top executives. At this point, we assumed he receives salary s_6 and promotional increases of p every six years until he retires.

We assumed the same promotion pattern for non-executives.

Figure 5.3 shows the job promotion structure for non-executives using the Malaysian Employees Federation's job categories as in MEF Salary and Fringe Benefits Survey for Non-executives (2002b).

Figure 5.3: Job Promotions Structure for Non-Executives



As we discussed in sub-section 4.3.3, we assumed that all individuals enter the labour force at the age of 22. Thus, the first promotion will be received after three years of

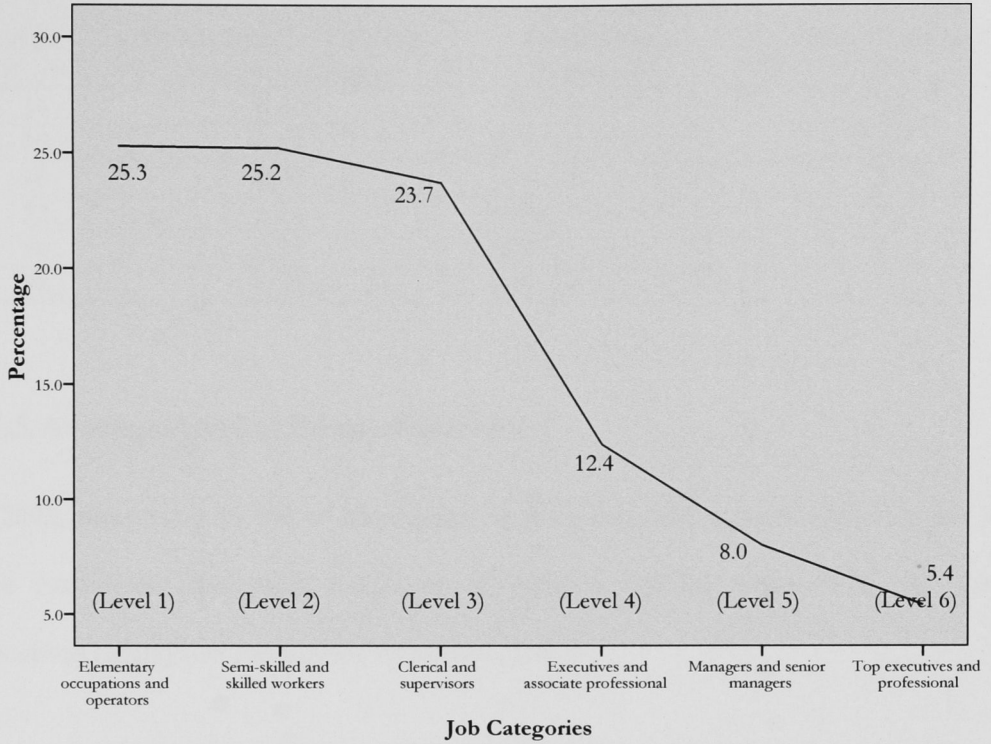
tenure, which is at the age of 25, the subsequent promotions at the ages of 28, 31, 34, 40, 46, and finally at the age of 52 for women before they retire on attaining age 56; and 58 for men before they retire at the age of 60.

Since the Malaysian Employees Federation's Salary and Fringe Benefits Survey for Executives and non-Executives does not contain any information on promotional salary increases, therefore in this study we used Watson Wyatt Worldwide's Total Remuneration Survey for Malaysia. According to the report, the average promotional increase for all employee categories from top management to non-executives is 10% (Watson Wyatt Worldwide, 2002).

Job promotions also depend on the promotion opportunities in the organisation. As a person climbs the career ladder, the chances of getting a job promotion to the next senior and top executive positions decline. This is due to the limited number of senior and top executive positions in the organisation.

We used the Labour Force Survey Report (2003) data to see the percentage distribution of employees by job categories in Malaysia as shown in figure 5.4.

Figure 5.4: Percentage Distribution of Employees by Job Categories



We assumed all employees are at level 1 when entering the labour force. The probability of getting a job promotion to the next level, which is level 2, is 0.99 (25.2 divided by 25.3). Then, the probability for being promoted to the level 3 is 0.94 (23.7 divided by 25.3). The probabilities are decreased at the higher positions – 0.49 to the level 4; 0.32 and 0.21 to the level 5 and 6 respectively. Then, we produced a promotional salary increase table by age as shown in table 5.2.

Table 5.2: Promotional Salary Increase by Age

Age	Probability of Getting Job Promotions	Average Promotional Increase x Probability	Promotional Salary Increase (%)
25	0.99	10% x 0.99 = 9.9%	9.9
28	0.94	10% x 0.94 = 9.4%	9.4
31	0.49	10% x 0.49 = 4.9%	4.9

Table 5.2: Promotional Salary Increase by Age (cont.)

Age	Probability of Getting Job Promotions	Average Promotional Increase x Probability	Promotional Salary Increase (%)
34	0.32	$10\% \times 0.32 = 3.2\%$	3.2
40	0.21	$10\% \times 0.21 = 2.1\%$	2.1
46	0.21	$10\% \times 0.21 = 2.1\%$	2.1
52	0.21	$10\% \times 0.21 = 2.1\%$	2.1
56	0.21	$10\% \times 0.21 = 2.1\%$	2.1
58	0.21	$10\% \times 0.21 = 2.1\%$	2.1

5.1.5 Average Annual Bonus Payment

In 2002, there were 91.9% of companies reported that they granted annual bonus to their executives (Malaysian Employees Federation, 2003a) while 91.8% to non-executives (Malaysian Employees Federation, 2003b).

The average annual bonus paid by companies for all categories of executives was 1.82 months of income (Malaysian Employees Federation, 2003a), and non-executives received 1.53 months of income (Malaysian Employees Federation, 2003b). In this research, we use the average of 1.68 months that applies for both executives and non-executives.

5.1.6 Employees Provident Fund (EPF)

The Employees Provident Fund (EPF) is a defined contribution plan based on a prescribed rate of contributions by employers and employees, accumulated as savings in a personal account with full withdrawal upon retirement. Under the EPF Act 1951, it is compulsory for all Malaysian employers and employees to contribute a percentage of his salary towards this fund

Since the establishment of the EPF, the contribution rates were increased a few times. The contribution rates were 5% of monthly salary for the employee and 5% for the employer in 1952 when the EPF initially started operation. It was increased further before the present 11% and 12% respectively.

Table 5.3: Contribution Rates of EPF for the Years 1952-2004

Year	Employee (%)	Employer (%)
1952 – June 1975	5	5
July 1975 – November 1980	6	7
December 1980 – December 1992	9	11
January 1993 – December 1995	10	12
January 1996 – March 2001	11	12
April 2001 – March 2002	9	12
April 2002 – May 2003	11	12
June 2003 – May 2004	9	12
From June 2004	11	12

Source: Employee Provident Fund, Malaysia, 2006

The EPF is structured into three types of accounts: namely Account I (60%), Account II (30%) and Account III (10%).

Each account is designed to serve the different needs of contributors and conditions under which a certain amount can be withdrawn.

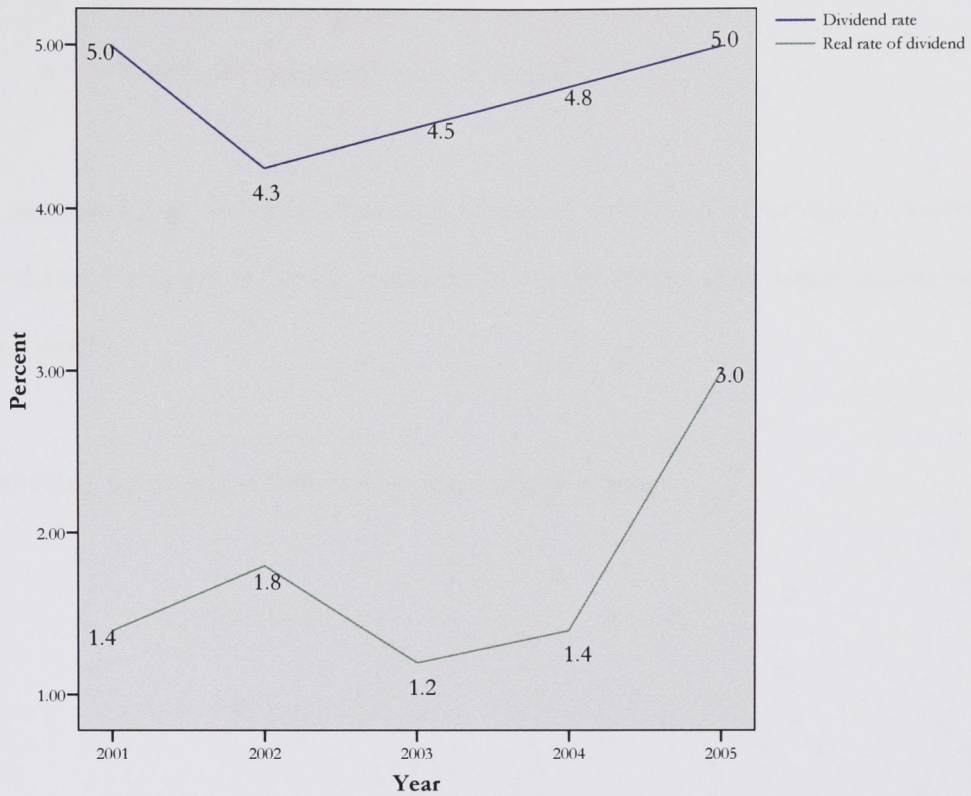
- Account I constitutes 60% of a member's savings for retirement in accordance with the primary objective of the scheme, to ensure that members have sufficient cash savings for retirement. Up to 20% of the balance in Account I can be transferred for investment purposes. This is a new feature introduced in 1996 to allow contributors to invest under the Members' Saving Investment Scheme.

- Account II (30%) allows a member to withdraw savings once for buying or building a house. This withdrawal is limited to 20% of the price of the house or 45 % of the savings but not exceeding RM20,000. Under this account, members will also be allowed to withdraw some money to finance the cost of their children's education.
- Account III (10%) is intended to help members to pay for critical illness expenses. This assistance, in the form of emergency medical expenses, allows 10% of the contribution to be withdrawn. It is not limited to the member only, but extends to the member's spouse, children, parents and siblings.

EPF savings can be withdrawn upon retirement. By the time a person retires, he has a considerable amount of savings with compounded dividends. The EPF, recognising its primary role as a trustee fund for old age security, practices prudent investment policies that generate reasonable returns with minimum risks. The EPF has maintained reasonable dividend payments over the years.

In this research, we assume the dividend rate at 5% per annum. Figure 5.5 shows the dividend rates of EPF for the year 2001 to 2005.

Figure 5.5: Dividend Rates of EPF for the Year 2001-2005



Source: Employee Provident Fund, Malaysia, 2006

After retirement, the EPF savings can be withdrawn in one lump sum or converted to a monthly pension.

The projection of EPF savings is the accumulation of future contributions and therefore it involves time value of money. The summing of these accumulated future contributions involves the summing of a geometric series.

Let,

X = Salary per month at entry into EPF membership

k = Total statutory minimum EPF contribution rate

s = Constant future salary increment rate per annum

d = Constant future EPF dividend rate

n = Number of completed years in service

In this calculation, we assumed there is no partial withdrawal of savings to finance the purchase of a house or for the treatment of critical illness of members themselves or their families.

Therefore, the projected EPF savings at the end of n years,

$$= 12Xk (1+d)^{n-1} * \left[\frac{1 - \left(\frac{1+s}{1+d}\right)^n}{1 - \left(\frac{1+s}{1+d}\right)} \right], \text{ if } s < d$$

$$= 12Xk (1+d)^{n-1} * \left[\frac{\left(\frac{1+s}{1+d}\right)^n - 1}{\left(\frac{1+s}{1+d}\right) - 1} \right], \text{ if } s > d$$

$$= 12Xk (1+d)^{n-1}, \text{ if } s = d$$

In 1994, a Periodical Payment Withdrawal Scheme has been introduced to allow members who have reached retirement age to withdraw their savings periodically, for instance monthly payment, until all savings are withdrawn. However, this scheme is not popular and as at December 31, 1999, only 176 members representing 0.24% of overall members who opted for the lump-sum payment have chosen the monthly payment option (Ong, 2001).

5.1.7 Social Security Organisation (SOCSO)

The Social Security Organisation (SOCSO) is an organization set up to administer, enforce and implement the Employees' Social Security Act, 1969 and the Employees' Social Security (General) Regulations 1971. Unlike the EPF, SOCSO is funded on the basis of the social insurance principle and offers an Employment Insurance Scheme, covering accidents at work and occupational diseases, and an Invalidity Pension Scheme, providing invalidity or death coverage.

An employee employed under a contract of service or apprenticeship and earn a monthly income of RM2,000 and below must compulsorily contribute to SOCSO regardless of the employment status whether it is permanent, temporary or casual in nature. Nevertheless, certain categories of employees are exempted from coverage namely government employees, domestic servants, self-employed persons and foreign workers.

The employee contribution rate is 0.5% of income while the employer pays 1.75%. The rates remained unchanged since SOCSO's inception in 1969 (Social Security Organisation, 2006).

Employees who suffer employment injuries will be entitled for a temporary disablement benefit equivalent to 80% of the average assumed daily wage (subject to a minimum daily rate of RM10) if he is certified unfit to work by a doctor for at least 4 days including the day of accident. This benefit will be paid for the period he is unable to work. If the medical board confirms that the employee suffers permanent disability as a result of the injuries sustained, he will be entitled to permanent disablement benefit

equivalent to 90% of the average assumed daily wage (subject to a minimum daily rate of RM10). Employee also eligible for invalidity pension after attaining age 55. According to statistic reported by SOCSO in 2004, the number of cases that caused permanent disability was 22,505 from 4,567,365 registered members – that are 0.49% (Social Security Organisation, 2006).

If the employee dies because of an employment injury, his dependants are entitled to receive dependent's benefit equivalent to 90% of the average assumed daily wage (subject to a minimum rate of RM10 per day). There were only 1,256 death cases related to employment in 2004 (Social Security Organisation, 2006).

If the employee dies before attaining 55 years of age and the cause of death is not related to his employment, his dependants will receive survivors pension between 50% to 65% of the average monthly wage depending on the number of contributions made in his behalf, subject to the condition that the total number of such monthly contributions made during the stated period is at least 24.

The monthly pension for the Invalidity Pension and Survivor's Pension is payable using the formula below,

$$\text{Pension} = 50\% + \frac{(\text{Total number of SOCSO contributions} - 24)}{12} * \text{Basic final salary}$$

5.2 Modelling of Income

To begin the analysis, we estimated the individual's total income for each year from projection of his current salary and retirement income.

For married couples, we estimated the income of both the husband and wife. In Malaysia, the head of the household is the husband. He is the source of an income or earnings stream to his family. We followed Goldsmith (1983) method that includes wife's income in determining the amount of life insurance needs on the husband. In his research, Goldsmith considered the wife's human capital accumulation in determining purchases of life insurance on the husband, taking into consideration the wife's labour force participation and the household size.

The factors involved in calculating the present value of income are,

x = Current age

$I_{h(x+t)}$ = Total income for the husband at age $x+t$

$(e_x^{ow})_h$ = Husband's working life expectancy

$(EPF \text{ Savings})_{x+(e_x^{ow})_h}$ = Husband's Employee Provident Fund savings on retirement

S_x = Current monthly salary at age $x+t$

EPF = The statutory minimum Employee Provident Fund (EPF) contribution rate (employee)

$SOCSO$ = Social Security Organisation's contribution rate

s = Constant future salary increment rate per annum

p = Constant promotional increment rate

${}_tP_x$ = Probability that a person age x will survive for t more years

i = Interest rate

V^t = Present value at time t

The formula to estimate the total income for the husband at age $x+t$ is as follows,

$$I_{h(x+t)} = 13.68 S_x (1+s)^t (p) {}_tP_x [1 - EPF - SOCSO]$$

Where,

13.68 is derived from $12S_x$ (annual salary at time $x+t$) plus $1.68S_x$ (1.68 months of annual bonus at time $x+t$).

And,

$$SOCSO = 0, \text{ when } S > \text{RM}2,000$$

$$s = 0.06, \text{ when } x+t > 1$$

And,

We define $1 \leq n \leq 9$

$$p = (1 + p_1)(1 + p_2)(1 + p_3) \dots (1 + p_9), \text{ where } x+t \geq a_n$$

$$\text{And where, } p_1 = 0.099, \text{ when } a_1 = 25$$

$$p_2 = 0.094, \text{ when } a_2 = 28$$

$$p_3 = 0.049, \text{ when } a_3 = 31$$

$$p_4 = 0.032, \text{ when } a_4 = 34$$

$$p_5 = 0.021, \text{ when } a_5 = 40$$

$$p_6 = 0.021, \text{ when } a_6 = 46$$

$$p_7 = 0.021, \text{ when } a_7 = 52$$

$$p_8 = 0.021, \text{ when } a_8 = 56$$

$$p_9 = 0.021, \text{ when } a_9 = 58$$

The income for the husband is estimated for each year until retirement age. On the retirement age, the husband receives the full amount of EPF savings.

Therefore, the present value of income for the husband is as follows,

$$PV(I_h) = I_{h(x+0)}V^0 + I_{h(x+1)}V^1 + I_{h(x+2)}V^2 + \dots + I_{h[x+(e_x^{ow})_h-1]}V^{(e_x^{ow})_h-1} \\ + (EPF \text{ Savings})_{x+(e_x^{ow})_h} V^{(e_x^{ow})_h}$$

$$PV(I_h) = \sum_x^{x+(e_x^{ow})_h} I_{h(x+t)}V^t + (EPF \text{ Savings})_{x+(e_x^{ow})_h} V^{(e_x^{ow})_h} \quad t = 0, 1, 2, 3 \dots t < (e_x^{ow})_h$$

$$\text{Where, } V = \frac{1}{1+i} = \frac{1}{1+0.03}$$

And (EPF Savings) is the projected EPF savings at the end of n years,

$$= 12Xk (1+d)^{n-1} * \left[\frac{1 - \left(\frac{1+s}{1+d}\right)^n}{1 - \left(\frac{1+s}{1+d}\right)} \right], \text{ if } s < d$$

$$= 12Xk (1+d)^{n-1} * \left[\frac{\left(\frac{1+s}{1+d}\right)^n - 1}{\left(\frac{1+s}{1+d}\right) - 1} \right], \text{ if } s > d$$

$$= 12Xk (1+d)^{n-1}, \text{ if } s = d$$

Next, again on a year-to-year basis, the income for the wife is projected.

Let,

$$x = \text{Husband's current age}$$

- y = Wife's current age
- $I_{w(y+t), h(x+t)}$ = Total income for the wife at age $y+t$ (while the husband's age is $x+t$)
- $(e_x^{ow})_h$ = Husband's working life expectancy
- $(EPF \text{ Savings})_{x+(e_x^{ow})_h}$ = Husband's Employee Provident Fund savings on retirement
- S_x = Husband's current monthly salary at age $x+t$
- EPF = The statutory minimum Employee Provident Fund (EPF) contribution rate (employee)
- $SOCSO$ = Social Security Organisation's contribution rate
- s = Constant future salary increment rate per annum
- p = Constant promotional increment rate
- ${}_tP_x$ = Probability that a husband age x will survive for t more years
- ${}_tP_y$ = Probability that a wife age y will survive for t more years
- f_{y+t} = Women's labour force participation rate at age $y+t$
- i = Interest rate
- V^t = Present value at time t

The formula to estimate the total income for the wife at age $y+t$ is as follows,

$$I_{w(y+t), h(x+t)} = 6.45696 S_x (1+s)^t (p) {}_tP_x (f_{y+t}) {}_tP_y [1 - EPF - SOCSO]$$

Where,

6.45696 is derived from $12S_x$ (annual salary at time $x+t$) plus $1.68S_x$ (1.68 months of annual bonus at time $x+t$) and times with 0.472 which is the percentage of women's income compared to men's income.

And,

$$SOCSO = 0, \text{ when } S > \text{RM}2,000$$

$$s = 0.06, \text{ when } x + t > 1$$

And,

We define $1 \leq n \leq 9$

$$p = (1 + p_1)(1 + p_2)(1 + p_3)\dots\dots\dots(1 + p_9), \text{ where } x + t \geq a_n$$

$$\text{And where, } p_1 = 0.099, \text{ when } a_1 = 25$$

$$p_2 = 0.094, \text{ when } a_2 = 28$$

$$p_3 = 0.049, \text{ when } a_3 = 31$$

$$p_4 = 0.032, \text{ when } a_4 = 34$$

$$p_5 = 0.021, \text{ when } a_5 = 40$$

$$p_6 = 0.021, \text{ when } a_6 = 46$$

$$p_7 = 0.021, \text{ when } a_7 = 52$$

$$p_8 = 0.021, \text{ when } a_8 = 56$$

The income for the wife is estimated for each year until retirement age. Therefore, the present value of income for the wife is as follows,

$$PV(I_w) = I_{w(y+0)}V^0 + I_{w(y+1)}V^1 + I_{w(y+2)}V^2 + \dots\dots\dots + I_{w[y+(e_y^{ow})_w]}V^{(e_y^{ow})_w-1}$$

$$+ (EPF \text{ Savings})_{y+(e_y^{ow})_w} V^{(e_y^{ow})_w}$$

$$PV(I_w) = \sum_y^{y+(e_y^{ow})_w} I_{w(y+t)}V^t + (EPF \text{ Savings})V^{(e_y^{ow})_w} \quad t = 0, 1, 2, 3 \dots t < (e_y^{ow})_w$$

Lastly, the general formula for the total present value of income is derived as follows,

$$PV(I) = \text{Present value of income for the husband} \\ + \text{Present value of income for the wife}$$

$$PV(I) = PV(I_h) + PV(I_w), \text{ where } PV(I_w) = 0 \text{ for single person.}$$

5.3 Analysis of Taxes

A portion of individual incomes is paid as taxes. Projecting income taxes requires performing tax calculations for each year in which the total family income is projected. These tax calculations are made using the existing tax tables and rules published by The Inland Revenue Department Malaysia regarding the average deductions of taxpayers by income level.

5.3.1 Malaysian Income Taxes

All individuals are liable to tax on income accrued in, derived from or remitted to Malaysia as stipulated in the Income Tax Act 1967. An individual is taxed on his chargeable income at graduated rates from 1% to 28% after the deduction of tax reliefs.

The tax year for Malaysian income tax rates is based on the calendar year. Effective from the year of assessment 2003, the income tax rates for individuals are as in table 5.4.

Table 5.4: Malaysian Income Tax Rates for Year of Assessment 2005

Taxable Income (RM)	Rates (%)
Up to 2,500	0
More than 2,500 to 5,000	1
More than 5,000 to 20,000	3
More than 20,000 to 35,000	7
More than 35,00 to 50,000	13
More than 50,00 to 70,000	19
More than 70,00 to 100,000	24
More than 100,00 to 250,000	27
More than 250,000	28

Source: The Inland Revenue, Malaysia, 2005

In ascertaining the taxable income of a person, various forms of tax relief are given in order to reduce his tax liability. Table 5.5 and 5.6 show tax personal deductions and tax rebates for year of assessment 2005.

Table 5.5: Malaysian Income Tax Personal Deductions for Year of Assessment 2005

Personal Deductions	RM
Self	8,000
Disabled individual (further deduction)	5,000
Spouse	3,000
Disabled spouse (further deduction)	2,500
Child	
Child (no limit on number of children)	800 per child
Child receiving full-time tertiary education	3,200
Disabled child	5,000
Fees for purposes of acquiring technical, vocational or industrial skill	up to 2,000
Medical expenses for parents	up to 5,000
Purchases of necessary basic supporting equipment for disabled person or for the use of his wife, child or parents who are disabled	up to 5,000
Life insurance premium and contribution to approved scheme or EPF or pension fund	up to 5,000
Insurance premium for educational or medical benefit	up to 2,000

Source: The Inland Revenue, Malaysia, 2005

Table 5.6: **Malaysian Income Tax Rebates for Year of Assessment 2005**

Tax Rebates	RM
Purchase of personal computer for own use and not for business purposes (once in 5 years)	400
Zakat fitrah ¹¹ (Islamic taxes)	3.40 per person

Source: The Inland Revenue, Malaysia, 2005

5.3.2 Modelling of Taxes

Projecting income taxes requires performing tax calculations for each year in which the total family income is projected.

The factors involved in calculating the present value of tax are,

x = Current age

y = Wife's current age

$T_{(xy+t)}$ = Total tax payable for married couple at age $x+t$ for the husband and at age $y+t$ for the wife

$T_{(x+t)}$ = Total tax payable for a single man before getting married at age $x+t$

$T_{(y+t)}$ = Total tax payable for a single woman before getting married at age $y+t$

(e_{xy}^{ow}) = Working life expectancy of husband or wife whichever occur last

(e_x^{om}) = Age at first marriage for men

(e_y^{om}) = Age at first marriage for women

V^t = Present value at time t

¹¹ Zakat fitrah is one of the major religious duties in Islam. Practically, zakat fitrah should be paid by all Muslims. Based on Malaysian situation, practically all Muslims pay zakat on self (zakat fitrah). The head of the family will pay a certain amount, normally RM3.40 per head to the authorised 'amil' or zakat collector.

ded = Personal deductions

reb = Rebates

The formula to calculate the tax is as follows,

$$\text{Taxable income in year } x+t = I_{x+t} - \textit{ded}$$

$$\text{Tax charged in year } x+t = \text{Tax on the first taxable income} + \text{Tax on the next taxable income}$$

Therefore, income tax payable in year $x+t$,

$$T_{x+t} = \text{Tax charges in year } x+t - \textit{reb}$$

To conduct the analysis of tax for the purpose of revision method, payable income tax is estimated for each year until retirement age.

Thus, the present value of the total income tax payable for the husband is,

$$PV(T) = T_{xy+0}V^0 + T_{xy+1}V^1 + T_{xy+2}V^2 + \dots + T_{xy+(e_{xy}^{ow})}V^{(e_{xy}^{ow})}$$

$$= \sum_{xy}^{xy+(e_{xy}^{ow})} T_{(xy+t)}V^t \quad t = 0, 1, 2, 3 \dots t < (e_{xy}^{ow})$$

For a single person, the tax payable is estimated for each year until the age at first marriage. Then the analysis continues on the combined account assessment.

For a currently single man,

$$PV(T) = T_{x+0}V^0 + T_{x+1}V^1 + T_{x+2}V^2 + \dots + T_{x+(e_x^{om})_h}V^{(e_x^{om})_h} + \dots + T_{xy+(e_{xy}^{ow})}V^{(e_{xy}^{ow})}$$

For a currently single woman,

$$PV(T) = T_{y+0}V^0 + T_{y+1}V^1 + T_{y+2}V^2 + \dots + T_{yx+(e_y^{om})_w}V^{(e_y^{om})_w} + \dots + T_{xy+(e_{xy}^{ow})}V^{(e_{xy}^{ow})}$$

5.4 Self-employed

Self-employed is a person who works independently and without employing compensated personnel. For example, a business people without wage-earning employees, independent professionals, taxi drivers, street vendors and others.

According to the Labour Force Survey Report 2003, there were only 15.5% self-employed persons in Malaysia (Department of Statistics, 2004).

In this research, we used the same methodology in estimating the personal income and tax for self-employed persons.

5.5 Assumptions in the Calculations

The assumptions in the analysis of income and tax are as follows:

- We assumed women earned 47.2% of the income earned by men.
- Constant future salary increment rate at 6% per annum.
- All individuals enter the labour force at the age of 22. Thus, the first promotion will be received after 3 years of tenure, which is at the age of 25,

the subsequent promotions at the ages of 28, 31, 34, 40, 46, 52 and finally at the age of 56 before the person retires on attaining age 60 for men and 56 for women.

- Average annual bonus of 1.68 months of income.
- We ignored any fringe benefits in addition to salaries, such as free medical treatment, personal accident and life insurance coverage, free or subsidised transport, annual bonus, retirement benefits and enhanced contributions to the Employees Provident Fund (EPF).
- There are 911,600 civil servants or 9.48% in Malaysia's 9.616 million labour force in year 2000 (Economic Planning Unit, 2002). Civil servants have an option to choose between Government Pension Scheme and the Employees' Provident Fund (EPF) for old age financial security. In this research, we assumed all employees including civil servants contribute to the EPF.
- Since the EPF contribution rates for the employer were maintained at 12% since December 1980, we assume the rate is 12% in this analysis. For the employee, the contribution rates were between 9% to 11% since December 1980, with the current rate at 11%. In this study, we assumed the contribution rate for the employee is 11%. Therefore $k = 23\%$.
- While the Employees Provident Fund (EPF) is compulsory for all Malaysian employees, Section 43 (8), EPF Act 1991 allows pensionable employees,

partnership, Malaysian citizens who are working overseas, housewives and self-employed persons to make voluntary contribution to the nation's largest provident fund to build up a financial nest for their retirement. In this research, we assumed all self-employed persons contribute to the EPF with the same contribution rates.

- EPF dividend rate at 5% per annum.
- Since the EPF's monthly payment option under the Periodical Payment Withdrawal Scheme is not popular among Malaysians, therefore we assumed that full amount of EPF savings is withdrawn upon attaining retirement age.
- Social Security Organisation (SOCSO) contribution rate of 0.5% for employees with monthly salary of less than RM2,000.
- The analysis of income tax for a married couple is based on the combined account assessment.
- The average inflation rate for the year 2005 is 3%. Therefore, in this research we assume the inflation rate is at 3% per annum.

Chapter 6

The Analysis of Expenditures

Expenditure pattern varies with income, family composition and life cycle behaviour. Differences in the expenditure patterns are brought about by the family's transition from one stage of life to another with the stage of life usually determined by the age of the head of household, the marital status and the number of children.

The first section of this chapter formulates a projection of the expenses of a person as the head of household and his spouse as a monetary expression based on their personal expenditures. The second section of this chapter estimates the cost of raising a child in Malaysia that includes the estimation of children's personal expenditures and cost of children's education.

6.1 Estimating Personal Expenditure Costs

The customary data source to estimate personal expenditure cost is the 1998/99 Household Expenditure Survey conducted by the Department of Statistics Malaysia. In

this survey, household consumption items are grouped into nine broad categories, following some international standards on data categorising. The nine broad categories are food, beverages and tobacco; clothing and footwear; gross rent, fuel and power; furniture, furnishings and household equipment; medical care expenses; transport and communications; recreation, entertainment, education and cultural services; and finally, miscellaneous goods and services.

The monthly household expenditure data is delineated by the number of persons in the household regardless of family relationship or life activity. Therefore, in this research we assume that one household is a single adult, whereas two households is a married couple.

Personal consumption costs vary with respect to a person's age and sex, and their food and non-food requirements also differ. Children require less food than adults, and women require less food than men in order to maintain an adequate nutritional standard.

Similar to the Patton and Nelson (1991) and other forensic economists' studies (Gilbert, 1991; Krueger, 2005) in estimating personal consumption costs in a wrongful death, we have divided consumption across adult males and females, and broken down the average monthly household expenditures into categories in order to determine the amount of direct personal consumption of one single adult and a married couple.

The first category in the Household Expenditure Survey is 'food'. To allocate food personal expenses, we used the direct calories intake method to estimate the quantities of food consumed by each member of the household – father, mother and their children.

We relied on the Ministry of Health Malaysia data regarding daily food and total calories consumed according to age and sex.

Table 6.1: Daily Calories Consumed for Adults by Age and Sex

Age	Male Total Calories Consumed	Female Total Calories Consumed
20 – 39	2,530	2,000
40 – 49	2,400	1,900
50 – 59	2,280	1,800
> 60	2,020	1,600

Source: Health Division, Ministry of Health Malaysia, 1991

However, since we do not know the age and sex of children in the family, we assumed the total calories consumed for each of the children is 1600¹². For example, we assumed three households in the data as a married couple with one child. Therefore, the proportion of monthly expenditure for food was divided into male and female total calories according to age of the head of household and children, with total calories consumed at 1600.

Say the average monthly expenditure for food is RM3,000 for three households with head of household in the age range of 20 – 39. The proportion of monthly food expenditure for the male adult in the household is $2,530/6,130 \times \text{RM}3,000 = \text{RM}1,238.17$. The proportion of monthly food expenditure for the female adult in the household is $2,000/6,130 \times \text{RM}3,000 = \text{RM}978.79$, and finally for the child is $1,600/6,130 \times \text{RM}3,000 = \text{RM}783.04$.

¹² The average of total daily calories consumed for children age 0 to 19 to the nearest hundred.

The second category is 'beverages and tobacco'¹³. These expenditures are regarded as adult-related expenses and were treated as a personal consumption cost for adults in the household.

The total amount of monthly household expenditures under the 'Clothing and footwear' category was divided equally among household members.

In this research, we followed the Patton and Nelson (1991) method in treated utilities. One-half of the total monthly household expenditures in the category of 'gross rent, fuel and power' were divided equally among the household members. The other half of the amount was considered to be undividable and was treated as consumption cost for head of household.

Expenditures under categories of 'furniture, furnishing and household equipment and operation', 'medical care and health expenses', 'transport and communication', 'recreation, entertainment, education and cultural services', and 'miscellaneous good and services' are jointly consumed by and benefit all family members. Therefore, the expenditures were all divided equally among household members.

¹³ Beverages in the Household Expenditure Survey mean alcoholic beverages. Beginning from 1998/99 survey, changes have been made on the component of main group of 'beverages and tobacco' whereby the subgroup of soft drinks was transferred in the main group of 'food' under the subgroup of coffee and tea.

6.1.1 Average Monthly Personal Expenditure Costs for Single Adult and Married Couple

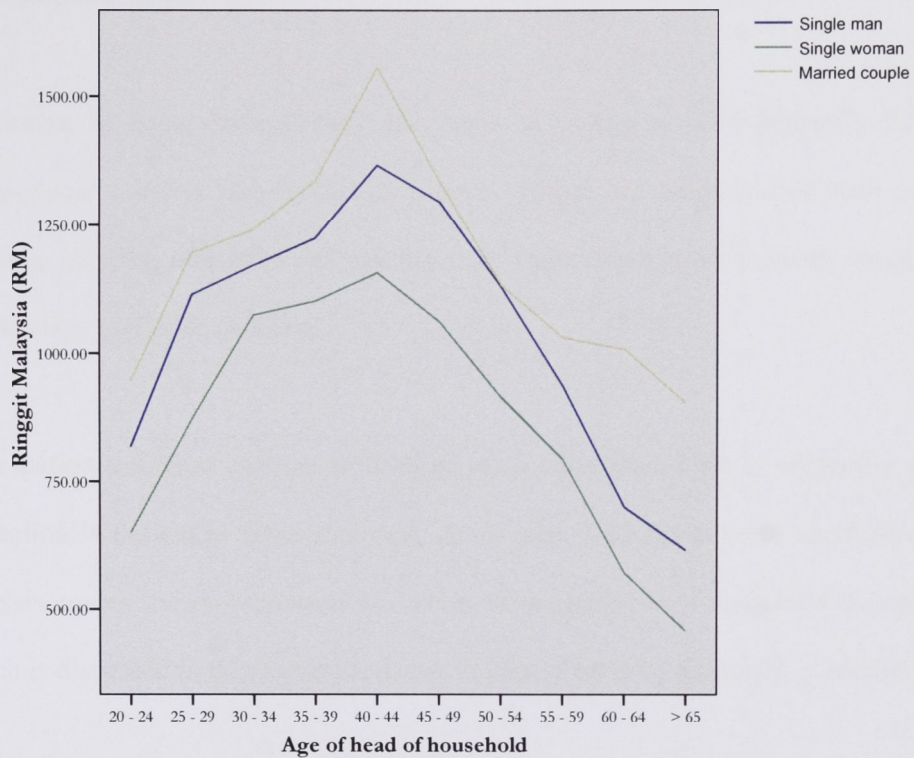
We used the 1998/99 Household Expenditure Survey data conducted by the Department of Statistics Malaysia to estimate the average monthly personal expenditure costs for single man and woman as well as for a married couple in Malaysia using the methodology as described in section 6.1.

For the married couple, we assume the head of the household is a man. We also assume that two households in the data is a married couple. Table 6.2 and figure 6.1 show the average monthly personal expenditure and distribution of average monthly personal expenditure for single adult and married couple.

Table 6.2: Average Monthly Personal Expenditure for Single Adult and Married Couple

Age of Head of Household	Single Man (RM)	Single Woman (RM)	Married Couple (RM)
20 – 24	818.18	650.14	945.95
25 – 29	1,115.27	873.25	1,196.88
30 – 34	1,172.82	1,075.70	1,242.46
35 – 39	1,225.58	1,102.88	1,337.33
40 – 44	1,366.98	1,157.70	1,556.07
45 – 49	1,295.65	1,062.80	1,335.95
50 – 54	1,129.57	914.83	1,133.79
55 – 59	936.86	793.62	1,031.36
60 – 64	700.36	572.80	1,008.95
> 65	616.01	458.42	903.34

Figure 6.1: Distribution of Average Monthly Personal Expenditure for Single Adult and Married Couple



Source: Department of Statistics Malaysia, 1999

6.2 Cost of Raising a Child in Malaysia

Children can bring great joy and fulfilment that cannot be measured in dollars.

Nonetheless, raising a child is a costly endeavour.

Bradbury (2004) defines the cost of a child as,

“... a measure of the actual amount of resources committed to child raising. Ignoring public goods and household public goods, we can think of this as the expenditure of time and money on children. Taking household public goods into

account, the cost to the parents can be defined as the additional income needed by a household in order to maintain parental living standards when they have an additional child.”

According to Espenshade (1984), the costs of raising a child generally have two components – direct and opportunity costs. Direct are expenditures such as food, clothing, housing, education and medical care. Opportunity costs typically forego when parents bear and raise children.

This section estimates the cost of bringing up a child from birth to university and our projection is limited to those that deal specifically with direct costs on children. The analysis covers the estimation of two areas of expenditures – household expenditures, which is discussed in this section and cost of education to be discussed in section 6.4.

The primary data used in this study is the 1998/99 Household Expenditure Survey. Household expenditures in this research are composed of direct parental expenses made on children from birth to university for all categories of expenditure items in the survey except ‘beverages and tobacco’ category that is regarded as an adult-related expense.

In estimating the cost of bringing up a child, we used the similar method to estimate the personal expenditure costs for single adult and married couple as in section 6.1

6.2.1 Average Monthly Expenditure Costs of Married Couple with Children by Number of Children

Since the data in the 1998/99 Household Expenditure Survey is limited¹⁴, we can only consider estimating the costs of children according to the number of children in a family.

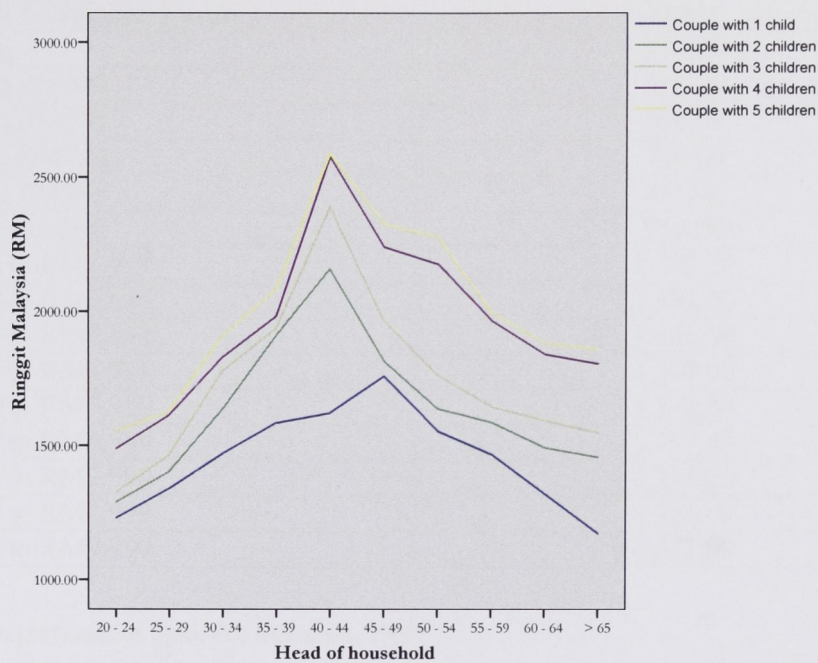
Table 6.3: Average Monthly Expenditure Costs of Married Couple with Children by Number of Children

Age of Head of Household	Couple with 1 child	Couple with 2 children	Couple with 3 children	Couple with 4 children	Couple with 5 children
20 – 24	1,230.18	1,288.62	1,325.24	1,489.71	1,553.77
25 – 29	1,340.64	1,403.82	1,467.25	1,614.31	1,627.42
30 – 34	1,472.70	1,637.17	1,782.06	1,832.52	1,907.95
35 – 39	1,586.98	1,913.22	1,939.88	1,985.14	2,083.18
40 – 44	1,623.81	2,159.94	2,390.81	2,579.11	2,587.56
45 – 49	1,759.91	1,818.60	1,966.95	2,244.03	2,327.10
50 – 54	1,556.29	1,639.99	1,764.72	2,179.62	2,279.33
55 – 59	1,470.20	1,588.65	1,647.59	1,969.17	1,998.56
60 – 64	1,320.69	1,494.37	1,596.50	1,843.66	1,884.03
> 65	1,172.20	1,458.49	1,549.19	1,808.50	1,861.60

¹⁴ There are no details on each component of a household, for example age and gender. However, there are information on the age of head of household and household size.

Figure 6.2: Distribution of Average Monthly Personal Expenditure for Married

Couple with Children



6.3 Household Expenditure Index

We made an adjustment of personal expenditure and cost of children for income inequality. It aims to capture the different level of monthly household expenditures between income levels.

The following table shows the average monthly household expenditure according to income group.

Table 6.4: Average Monthly Household Expenditure According to Income Level

Income Level	Monthly Household Expenditure (RM)
< RM500	371.00
RM500 to RM599	552.00
RM600 to RM699	650.00
RM700 to RM799	750.00
RM800 to RM899	851.00
RM900 to RM999	950.00
RM1,000 to RM1,999	1,429.00
RM2,000 to RM2,999	2,384.00
RM3,000 to RM3,999	3,401.00
RM4,000 to RM4,999	4,367.00
RM5,000 to RM5,999	5,320.60
RM6,000 to RM6,999	5,797.40
RM7,000 to RM7,999	6,274.20
RM8,000 to RM8,999	6,751.00
RM9,000 to RM9,999	7,227.80

Source: Department of Statistics Malaysia, 1999

According to 1999 Household Income Survey, the average monthly household income for the year 1999 is RM2,472 (Department of Statistics, 2000). Therefore, in this analysis, we assumed the average monthly personal expenditure for single adult and married couple as in table 6.4; and the average monthly expenditure costs for married couple as in table 6.5 are based on a person with average monthly household income of RM2,472. From table 6.4, we set the expenditure index at 1.00 for income level of RM2,000 to RM2,999. Then, we calculated the indexes for other income levels.

Table 6.5: Household Expenditure Index

Income Level	Monthly Household Expenditure (RM)	Household Expenditure Index
< RM500	371.00	0.2
RM500 to RM599	552.00	0.2
RM600 to RM699	650.00	0.3
RM700 to RM799	750.00	0.3
RM800 to RM899	851.00	0.4
RM900 to RM999	950.00	0.4
RM1,000 to RM1,999	1,429.00	0.6
RM2,000 to RM2,999	2,384.00	1.00
RM3,000 to RM3,999	3,401.00	1.43
RM4,000 to RM4,999	4,367.00	1.83
RM5,000 to RM5,999	5,320.60	2.23
RM6,000 to RM6,999	5,797.40	2.43
RM7,000 to RM7,999	6,274.20	2.63
RM8,000 to RM8,999	6,751.00	2.83
RM9,000 to RM9,999	7,227.80	3.03

We then estimated the subsequent household expenditure index for income levels of more than RM10,000.

For income group of RM5,000 to RM5,999 and above, the household expenditure index increases by 0.2. Therefore, we assumed the same pattern for income levels of more than RM10,000, which is the household expenditure index increases by 0.2. For example, the household expenditure index for income group of RM10,000 to RM10,999 is 3.23.

6.4 Children Education Cost

In Malaysia, most primary and secondary education for Malaysian children is provided by the public schools. Private schools only play a minimal role. There are only 266

private schools (Department of Private Education, 2001) compared to 1,997 government-assisted primary and secondary schools in Malaysia (Department of Statistics, 2004).

The data in the 1998/99 Household Expenditure Survey under the category of 'recreation, entertainment, education and cultural services' only covers the expenditures of school and study fees. However, these expenditures exclude the cost of a university education.

6.4.1 University Education

In Malaysia, there are currently seventeen public universities including one international university and six university colleges funded by the Malaysian government providing undergraduate and postgraduate studies. The capacity of all the seventeen public universities are 307,121 (Ministry of Higher Education, 2005).

However, the public universities are unable to cater for the rising demand for higher education in the country. Private higher education began to emerge in the early 1980s but started to mushroom when the Private Higher Education Institution Act¹⁵ was enforced in year 1996. At present, there are eleven universities, eleven university colleges, five foreign university branch campuses and five hundred and thirty-two colleges offering undergraduate and postgraduate studies, franchise degree programmes as well as foreign university degree programs to cater to the growing demand for tertiary education in Malaysia. (Ministry of Higher Education, 2005). These institutions

¹⁵ The Private Higher Education Institutions Act (1996) makes provisions for the establishment of private universities and university colleges, branch campuses of foreign universities as well as the upgrading of existing private colleges to universities.

of higher learning are under the jurisdiction of the Ministry of Higher Education and are stringently governed by various legislations to ensure provision of quality education.

6.4.2 Ethnicity and University Education Policy in Malaysia

Malaysia's public policies, including its education policy, have been constructed under the assumption that the Malay majority needs economic protection from the non-Malay immigrants, which are Chinese and Indians (Pong, 2005).

The Malaysian New Economic Policy (NEP) was a socio-economic restructuring¹⁶ program launched by the Malaysian government in 1971. Under the NEP, a quota system in tertiary education was introduced to ensure an equitable distribution of enrolment from the various races. Although the official university quota is 55:35:10 in the allocation of university seats among Bumiputera (Malays and other indigenous groups), Chinese and Indians; the actual quota of intake to public universities was far in excess.

As reported in the Malaysia Economic Consultative Council II (MAPEN II) Report (2001), the percentage of Bumiputera enrolment in the public universities was 74.6% and 25.4% for non-Bumiputera for year 1990. The enrolment percentage was about the same in 1999 with 72.7% for Bumiputera and 27.3% for non-Bumiputera.

¹⁶ The 13 May 1969 racial riot was diagnosed as being due to the failure of market forces to redress economic inequality among the various races. The Malays were discriminated in their own country in terms of employment and education. Therefore, the New Economic Policy was introduced in 1971 to restructure the society.

In 2002, a meritocracy system was introduced for public university intakes to replace the quota system. Under the first meritocracy system, the percentage for Malays in public university intake was still high – 68.9% of university places were offered to Bumiputera students, 26.4% to Chinese and 4.7% to Indians.

Besides all these, MARA University of Technology (UiTM) is a public university offered for Bumiputera students only. UiTM is the largest university in Malaysia with a student population of 86,664 (28.2% of total public university seats) in 14 branch campus throughout the country (Ministry of Higher Education, 2005).

The high percentage of Bumiputera enrolment in the public universities has forced many Chinese and Indian students to enter private universities and colleges. The Malaysia Economic Consultative Council II (MAPEN II) Report (2001) shows that as at the end of 1999, students in the private universities and colleges comprised 80.6% non-Bumiputera and only 19.4% Bumiputera. Studying in private universities and colleges is usually more expensive than the public universities.

Therefore, we assumed the education cost for Chinese and Indians are higher than for Malays in this analysis.

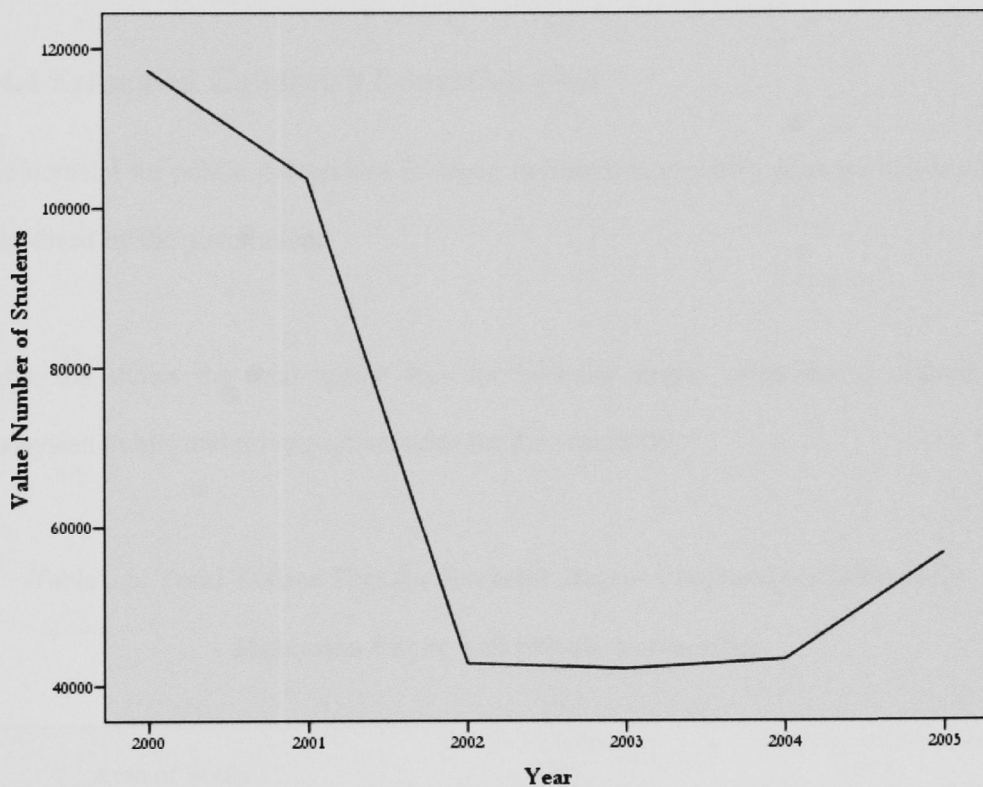
6.4.3 Study Abroad

Prior to the 1997 economic crisis, Malaysia sent thousands of students abroad for further studies. The buoyant economy made an overseas education affordable even to middle-class families. Most of the overseas educational expenditure was a cost to the

non-Bumiputera families whereas most of the Bumiputera students were on government scholarship (Sivalingam, 2005).

When the economic crisis hit Malaysia in 1997, many middle-class parents found it more difficult to send their children to study overseas. Since then, the number of Malaysian students going abroad to further their studies has dropped sharply.

Figure 6.3: Number of Students Studying Abroad, Year 2001-2005



Source: Ministry of Higher Education, 2005

As the cost of studies abroad is expensive, middle-class parents especially Chinese and Indians chose to send their children to study locally in Malaysian private universities and colleges. However, the government is still sending sponsored students abroad as

local institutions are unable to provide enough places to cater to the demand for higher education. The limited sponsorship is only for the brightest students studying in the top university programmes.

Since there were only small numbers of students studying abroad – only 56,609 students and mostly are sponsored students, compared to 307,121 students in public universities and 258,825 students in private universities and colleges (Ministry of Higher Education, 2005), we excluded the cost of studying abroad in our analysis.

6.4.4 Estimated Children's Education Cost

The demand for public universities is strong in Malaysia probably because it is heavily subsidised by the government.

Table 6.6 shows the total tuition fees for bachelor degree programmes offered by Malaysian public and private universities for the year 2006

Table 6.6: Total Tuition Fees for Bachelor Degree Programmes Offered by Malaysian Public and Private Universities

Area of Study	Public Universities (RM)	Private Universities (RM)
Business	4,700	38,657
Computer Science	5,700	36,568
Engineering	6,500	50,664
Medical	9,800	271,317
Law	5,800	72,800
Pharmacy	5,000	109,241
Science	5,000	59,943
Arts	4,200	65,072
Average	5,838	88,033

Source: Economic Planning Unit, 2006.

In estimating the cost of education, we estimated that 70% of Bumiputera are studying in public universities and 30% of them are studying in private universities. This is based on the fact that the percentage of public universities enrolment for Bumiputera were between 74.6% in year 1990 to 68.9% in 2002 when the meritocracy system was introduced. Thus, we assumed the average percentage of public universities enrolment for Bumiputera students would be 70% in the future. This indicates the likelihood of a Bumiputera student goes into public university with lower education cost is 0.7 while the probability of 0.3 to study in private university.

Therefore, the estimated cost of education for Bumiputera (Malays and other indigenous groups) is as follows,

$$\begin{aligned} \text{Cost of education for Bumiputera} &= \text{RM5,837.50 (0.7)} + \text{RM88,032.75 (0.3)} \\ &= \text{RM30,496.08} \end{aligned}$$

For a non-Bumiputera (Chinese and Indian) student, the chances of studying in the public universities is 0.3, while the probability of studying in the private universities with higher education cost is 0.7.

$$\begin{aligned} \text{Cost of education for non-Bumiputera} &= \text{RM5,837.50 (0.3)} + \text{RM88,032.75 (0.7)} \\ &= \text{RM63,374.18} \end{aligned}$$

6.5 Modelling of Expenditures

Expenditures in this model consist of the projection of the total amount of household expenditures and cost of university education for children.

First, we estimated the total amount of household expenditures for each year until the expected age of death of the husband or wife whichever occur last.

The factors involved in calculating the expenditures are,

x = Husband's current age

y = Wife's current age

E_{x+t} = Total expenditure costs at age $x+t$

HEI = Household expenditure Index

$HE_{(xy+t)}$ = Average monthly household expenditure for married couple at age $x+t$ for the husband and at age $y+t$ for the wife

$HE_{(x+t)}$ = Average monthly household expenditure for a single man before getting married at age $x+t$

$HE_{(y+t)}$ = Average monthly household expenditure for a single woman before getting married at age $y+t$

(e_{xy}^o) = Life expectancy of husband or wife whichever occur last

(e_x^{om}) = Age at first marriage for men

(e_y^{om}) = Age at first marriage for women

V^t = Present value at time t

The formula to calculate the household expenditure is as follows,

$$E_{x+t} = 12 HE_{x+t} HEI (1+i)^t \quad t = 0, 1, 2, 3 \dots t < (e_{xy}^o)$$

The present value of household expenditure for the husband is determined with this formula,

$$\begin{aligned} PV(E) &= E_{xy+0}V^0 + E_{xy+1}V^1 + E_{xy+2}V^2 + \dots + E_{xy+(e_{xy}^o)}V^{(e_{xy}^o)} \\ &= \sum_{xy}^{xy+(e_{xy}^o)} E_{(xy+t)}V^t \quad t = 0, 1, 2, 3 \dots t < (e_{xy}^o) \end{aligned}$$

For a single man and woman, we used the similar method above.

For a currently single man,

$$PV(E) = E_{x+0}V^0 + E_{x+1}V^1 + E_{x+2}V^2 + \dots + E_{x+(e_x^{om})_h}V^{(e_x^{om})_h} + \dots + E_{xy+(e_{xy}^o)}V^{(e_{xy}^o)}$$

For a currently single woman,

$$PV(E) = E_{y+0}V^0 + E_{y+1}V^1 + E_{y+2}V^2 + \dots + E_{yx+(e_y^{om})_w}V^{(e_y^{om})_w} + \dots + E_{xy+(e_{xy}^o)}V^{(e_{xy}^o)}$$

Secondly, we incorporated the children's university education cost in our model, as the cost is not included in the household expenditures.

Let,

OE = Total of other expenses

b_i = Median age at birth for the i child according to age of mother, where

$$i = 0, 1, 2, \dots, N$$

$$\begin{aligned}
PV(OE) = & \text{(Education cost for the first child)}_{y+b_1} V^{b_1-y} \\
& + \text{(Education cost for the second child)}_{y+b_2} V^{b_2-y} + \dots \\
& + \text{(Education cost for the } n^{\text{th}} \text{ child)}_{y+b_n} V^{b_n-y}
\end{aligned}$$

6.6 Assumptions in the Calculations

The assumptions in the analysis of expenditures and post death needs are as follows:

- The analysis of expenses is based on the 1998/99 Household Expenditure Survey with adjustment for spending pattern according to income classes.
- In estimating the cost of education, we assume that every child goes to university locally after completing their secondary school.
- We assume the probability of a Malay student goes into public university with lower education cost is 0.7, while the probability of 0.3 to study in private university. For Chinese or Indian student, the probability of studying in the public universities is 0.3 and 0.7 to study in the private universities with higher education cost.
- Children education cost is based on the Economic Planning Unit report on the tuition fees for bachelor degree programme offered by Malaysian public and private universities.

- Dependents include spouse and children below 22 years old.
- Inflation rate at 3% per annum.

Chapter 7

The Analysis of Income and

Expenditures after Death of the

Breadwinner and Post-Death Needs

Chapter 7 discusses the analysis of income and expenditures after the death of the breadwinner. It covers the various needs of the family and the role of life insurance in meeting these needs. The chapter also discusses the importance of having a will and the role of an executor.

The chapter begins by discussing the various needs of the family after the death of the breadwinner. These needs include the immediate expenses of the funeral, the ongoing expenses of the family, and the need for income replacement. It then discusses the role of life insurance in meeting these needs and the importance of having a will.

The chapter concludes by discussing the importance of having a will and the role of an executor. It also discusses the importance of having a trust and the role of a trustee. The chapter is a comprehensive guide to the analysis of income and expenditures after the death of the breadwinner.

Chapter 7

The Analysis of Income and Expenditures after Death of the Breadwinner and Post Death Needs

The death of the breadwinner usually terminates an income stream that the family has relied upon. The costs of daily living for survivors and post death expenses are needed to leave the family in their current standard of living.

So far we have constructed various components that made up the revision method life cycle model. In the first section of this chapter, we analyse the potential sources of income following death of the breadwinner.

The second section of this chapter estimates the household expenditures for the surviving families. There are also other needs that arise following the death of the breadwinner, for instance household debts and funeral expenses. This chapter also

estimates these additional concerns and hence includes post-death needs in the revision method.

7.1 The Analysis of Income after Death of the Breadwinner

In Malaysia, a man is typically the breadwinner of a family. We considered the following potential sources of income for the family after the death of the breadwinner – spouse’s income and Employee Provident Fund (EPF) savings. Any lump sum family inheritance is ignored.

7.1.1 Spouse’s Income

After the death of the breadwinner, we assumed the widow continues to work. Therefore, we estimated the spouse’s total income for each year until the working spouse retires. We used the similar method in estimating the analysis of income as in chapter 5.

Personal income has to be taxed. Thus, we deducted the amount of tax from the spouse’s income using the same method, tax rates and tables as discussed in section 5.3.

7.1.2 Employee Provident Fund (EPF) Savings after Death of the Breadwinner

On the death of the EPF members, this fund allows beneficiaries to withdraw the full amount on their entire savings in one lump sum or convert it into a monthly pension. In this study, we assumed that the full amount of the EPF savings is withdrawn upon death of the breadwinner. We used the same method in estimating the EPF savings after retirement as in sub-section 5.1.6.

7.2 The Analysis of Expenditures after Death of the Breadwinner

A widow (or widower) and her (or his) children need to live within their current standard of living and do all the things after the breadwinner dies that they had and could do before.

7.2.1 Average Monthly Expenditure Costs for Widow (or Widower) with Her (or His) Children

We used the data on the average monthly personal expenditure costs for a single adult and married couple (table 6.2) as discussed in sub-section 6.1.1; and the data on the average monthly expenditure costs of married couple with children (table 6.3) as in sub-section 6.2.1 to estimate the average monthly expenditure costs for single adult with children.

We subtracted the expenditures on married couple with children (as in column 3 in table 6.3) with the expenditures for a married couple (as in table 6.2) to obtain the estimated average monthly expenditure costs for children. Then, we added the expenditures of single man (as in column 1 in table 6.2) to get the average monthly expenditure costs for a widower and his children.

Table 7.1: Average Monthly Expenditure Costs of a Widower with Children by Number of Children

Age of Widower	Widower with 1 child	Widower with 2 children	Widower with 3 children	Widower with 4 children	Widower with 5 children
20 – 24	1,102.41	1,160.85	1,197.47	1,361.94	1,426.00
25 – 29	1,259.03	1,322.21	1,385.64	1,532.70	1,545.81
30 – 34	1,403.06	1,567.53	1,712.42	1,762.88	1,838.31
35 – 39	1,475.23	1,801.47	1,828.13	1,873.39	1,971.43
40 – 44	1,434.72	1,970.85	2,201.72	2,390.02	2,398.47
45 – 49	1,719.61	1,778.30	1,926.65	2,203.73	2,286.80
50 – 54	1,552.07	1,635.77	1,760.50	2,175.40	2,275.11
55 – 59	1,375.70	1,494.15	1,553.09	1,874.67	1,904.06
60 – 64	1,012.10	1,185.78	1,287.91	1,535.07	1,575.44
> 65	884.87	1,171.16	1,261.86	1,521.17	1,574.27

Next, we used the same method in estimating the average monthly expenditure costs for a widow and her children.

Table 7.2: Average Monthly Expenditure Costs of a Widow with

Children by Number of Children

Age of Widower	Widow with 1 child	Widow with 2 children	Widow with 3 children	Widow with 4 children	Widow with 5 children
20 – 24	934.37	992.81	1,029.43	1,193.90	1,257.96
25 – 29	1,017.01	1,080.19	1,143.62	1,290.68	1,303.79
30 – 34	1,305.94	1,470.41	1,615.30	1,665.76	1,741.19
35 – 39	1,352.53	1,678.77	1,705.43	1,750.69	1,848.73
40 – 44	1,225.44	1,761.57	1,992.44	2,180.74	2,189.19
45 – 49	1,486.76	1,545.45	1,693.80	1,970.88	2,053.95
50 – 54	1,337.33	1,421.03	1,545.76	1,960.66	2,060.37
55 – 59	1,232.46	1,350.91	1,409.85	1,731.43	1,760.82
60 – 64	884.54	1,058.22	1,160.35	1,407.51	1,447.88
> 65	727.28	1,013.57	1,104.27	1,363.58	1,416.68

We made an adjustment of expenditures according to the household expenditure index discussed on section 6.3.

7.2.2 Children Education Cost

We used the same method as in section 6.4.

7.3 Post Death Needs

The estimation of the amount of income, personal tax and household expenditures is a part of human life value analysis. This method may not fully anticipate other needs that arise with the death of a person. An estimate of these additional concerns is obtained through a needs analysis approach. Therefore, we incorporated post death needs in the revision method. The immediate post death needs the family have to meet following the death of the breadwinner is the funeral expenses and household debts.

7.3.1 Funeral Expenses

Funeral expenses generally need to cover the costs of the ceremonial component of a burial or cremation as well as the price of a burial plot and cremation cost. Cemeteries and crematoriums are under the local authority's responsibility as stated in the Local Government Act 1974.

Therefore, the costs for burial plot and cremation could be different from one area to another, but usually only involves a small amount of money. For example, the cost of a burial plot in the area of Ampang Jaya in the state of Selangor is only from RM100 to RM200; and RM100 for cremation cost. Besides, there are many other costs associated with funeral, for instance the cost of a coffin, hearse, a religious requiem ceremony, headstone and many more.

There is no funeral or burial insurance in Malaysia, however many insurance policies now include funeral expenses.

To estimate the total funeral expenses, we will analyse the funeral benefits as given in the Personal Accident policies by the first five largest personal accident insurance providers in Malaysia – Mayban General Insurance Berhad with 11.2% market share in personal accident insurance, Allianz General Insurance Berhad (8.1%), ACE Synergy Insurance Berhad (7.8%), Hong Leong Assurance Berhad (7.5%) and Pacific Insurance Berhad (5.8%).

Table 7.3: Funeral Expenses Benefits by the Five Largest Personal Accident

Insurance Providers in Malaysia

Insurance Company	Market Share (%)	Funeral Expenses Benefits
Mayban General Insurance Berhad	11.2	RM2,000 for plan 1 (death benefit of RM100,000). RM6,000 for plan 2 (death benefit of RM300,000).
Allianz General Insurance Berhad	8.1	RM5,000 for all plans.
ACE Synergy Insurance Berhad	7.8	RM1,000 for plan 1 (death benefit of RM50,000). RM1,500 for plan 2 (death benefit of RM75,000). RM2,000 for plan 3 (death benefit of RM100,000).
Hong Leong Assurance Berhad	7.5	RM5,000 for plan 1 (death benefit of RM300,000). RM7,500 for plan 2 (death benefit of RM500,000).
Pacific Insurance Berhad	5.8	RM5,000 for death benefit of RM100,000.

The funeral expenses benefits range from RM2,000 to RM7,500 for Personal Accident policies with death benefits of RM100,000 or more. The average amount is RM4,750,

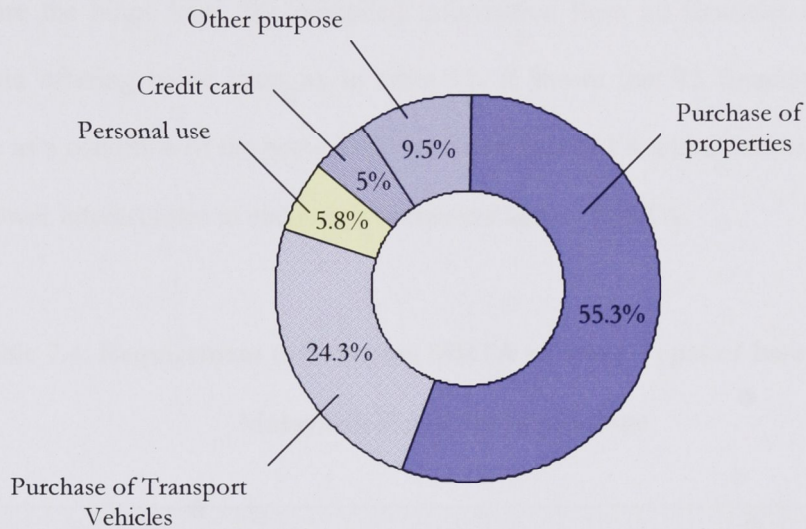
We rounded the average amount of RM4,750 to the nearest hundred and assume the funeral expenses of RM5,000 in our calculations. This is relatively close to the funeral expenses offered by Allianz General Insurance Berhad as a second largest Personal Accident Insurance provider in Malaysia.

7.3.2 Household Debts

After death of the breadwinner, the Central Bank of Malaysia (2006) reported that 55.3% of total household debts in Malaysia were made of mortgages, while another 24.3% were hire-purchase financing. Credit card debts made up only 5% of household debts.

Figure 7.1 shows the composition of debts by purpose.

Figure 7.1: Composition of Debts by Purpose, Year 2006



Source: Central Bank of Malaysia, 2006

In Malaysia, majority of people buy houses using home loan provided by banks and insurance companies¹⁷. Until the late 90s, it was relatively standard for buyers to pay between 20 and 30 per cent of the purchase price and raise a home loan for the balance (Wong, 2005). Today, with the margin of financing going as high as 95% of the value of the house, it reduced the buyer ability to raise large down- payments and hence a huge amount of home loan is required.

¹⁷ Under the Insurance Act, all licensed insurance companies are empowered to provide housing loans to the public. The funds from insurance companies are internally generated giving them an additional edge to provide attractive long-term fixed rate housing loans for the benefit of the public.

As home loans are a big commitment, repaying it can be a major burden if calamity strikes. Although it is not compulsory to have Mortgage Reducing Term Assurance (MRTA) to secure home loans, most financial institutions make it compulsory to insure against such an event. Alternatively, borrowers can opt for various types of life policies to secure the home loan. We compiled information from all financial institutions in Malaysia offering home loans as in table 12. It shows that 13 financial institutions impose as a condition of the home loan to take up an MRTA and 2 financial institutions offer lower interest rates to encourage borrowers to have MRTA.

Table 7.4: Requirement to Purchase MRTA or other Types of Insurance by Malaysian Financial Institutions

No.	Financial Institutions	Requirement to purchase MRTA or other types of insurance
1.	Malayan Banking Berhad	MRTA is compulsory.
2.	Affin Bank Berhad	MRTA is compulsory for houses priced RM250,000 and below.
3	Alliance Bank Malaysia Berhad	MRTA is not compulsory, but higher interest rates applied.
4.	Bumiputra-Commerce Bank Berhad	MRTA is compulsory.
5.	CIMB Bank Berhad	MRTA is compulsory.
6.	OCBC Bank (Malaysia) Berhad	MRTA is compulsory for houses priced RM100,000 and below.
7.	EON Bank Berhad	MRTA is compulsory.
8.	AmBank (M) Berhad	MRTA is not compulsory
9.	RHB Bank Berhad	MRTA is compulsory
10.	Hong Leong Bank Berhad	MRTA is not compulsory, but higher interest rates applied.
11.	HSBC Bank Malaysia Berhad	MRTA is not compulsory
12.	Public Bank Berhad	MRTA is compulsory.
13.	United Overseas Bank (Malaysia) Berhad	MRTA is compulsory.
14.	Citibank Berhad	MRTA or Mortgage Level Term Assurance (MLTA) is compulsory.

Table 7.4: Requirement to Purchase MRTA or other Types of Insurance by

Malaysian Financial Institutions (cont.)

No.	Financial Institutions	Requirement to purchase MRTA or other types of insurance
15.	Standard Chartered Bank Malaysia Berhad	MRTA is compulsory for margin of finance of 70% and above of the loan amount.
16.	Bank Simpanan Nasional	MRTA is compulsory.
	Bank Rakyat	Takaful Mortgage Reducing Term Assurance is compulsory.
17.	Bank Islam Malaysia Berhad	Takaful Mortgage Reducing Term Assurance is compulsory.
18.	Bank Muamalat Malaysia Berhad	MRTA is compulsory.
19.	American International Assurance	MRTA of AIA life insurance policy is compulsory.
20.	ING Insurance Berhad	MRTA of ING life insurance policy is compulsory.

Since most financial institutions require Mortgage Reducing Term Assurance (MRTA) or other types of insurance including Mayban Banking Berhad as the largest bank in Malaysia is and dominant in house financing with 43.4% market share, therefore we will not include mortgage repayment in our analysis to avoid redundant insurance coverage.

The second largest category that made up household debts in Malaysia was hire purchase financing for transport vehicles (The Central Bank of Malaysia, 2006). However, we will not include this in the analysis since the estimation has been included in the average monthly expenditure per household (see sub-section 6.1) based on Household Expenditure Survey data. The data under the category of 'transport and

communication' covers the expenditure for transport including vehicle purchase, road tax, motor insurance, maintenance and parking fee.

Another category of household debts is credit card debt that made up only 5% of household debts (The Central Bank of Malaysia, 2006). According to the Financial Stability and Payment Systems Report 2006, the outstanding balance for credit cards has been rising over the years; however, it has not posed much concern to financial stability. 60% of credit card purchases are being consistently paid in full by the cardholders over the past three years. This is a clear indication that a substantial proportion of the cardholders used credit cards to facilitate payments rather than as a source for credit. Therefore, we will not include credit card debts in the analysis.

7.4 Formulation of the Income and Expenditure after Death of the Breadwinner and Post Death Needs

In this sub-section, we determined the amount of income and expenditure after death of the breadwinner. A widow and her children can continue to live within their current standard of living if they have and do all the things, after the breadwinner dies, that they had and could do before. Post death needs are also incorporated in the formulation. At the end, net income surplus or deficit is estimated and the amount of income deficit is the amount of insurance required to leave the family in their current standard of living.

The factors involved in calculating the present value of income after death of the breadwinner are:

$$x = \text{Current age}$$

$(e_x^o)_h$ = Husband's life expectancy

$(e_x^o)_w$ = Wife's life expectancy

$(e_x^{ow})_h$ = Husband's working life expectancy

$(e_x^{ow})_w$ = Wife's working life expectancy

NI_{x+t} = Net income surplus or deficit in year $x+t$

GI_{x+t} = Gross income surplus or deficit in year $x+t$

$I_{h(x+t)}$ = Total income for the husband at age $x+t$

$I_{w(x+t)}$ = Total income for the wife at age $x+t$

T_{x+t} = Total taxes payable in year $x+t$

E_{x+t} = Total household expenditures in year $x+t$

We developed two models:

1. The income surplus or deficit for the widow after death of the breadwinner.
2. The income surplus or deficit for the widower after death of his wife. The widower is the breadwinner in the family.

7.4.1 Income Surplus or Deficit for the Widow

The gross income surplus or deficit for the widow after death of the breadwinner is calculated as follows:

$$GI_{x+t} = (I_{w(x+t)} - T_{x+t}) - E_{x+t}$$

The income and personal tax are calculated for each year until the widow's expected retirement age, while the expenses are calculated for each year until the widow's expected age of death.

Therefore, the present value of gross income surplus or deficit is as follows,

$$\begin{aligned}
 PV(GI) &= \left[(I-T)_{x+1} + (I-T)_{x+2} + (I-T)_{x+3} + \dots + (I-T)_{x+(e_x^{ow})_w} \right] \\
 &\quad + \left[E_{x+1} + E_{x+2} + E_{x+3} + \dots + E_{x+(e_x^o)_w} \right] \\
 PV(GI) &= \sum_x^{x+(e_x^{ow})_w} (I-T)_{x+t} V^t - \sum_x^{x+(e_x^o)_w} E_{x+r} V^r \quad t = 0, 1, 2, 3 \dots x+t \leq (e_x^{ow})_w \\
 &\quad r = 0, 1, 2, 3 \dots x+r \leq (e_x^o)_w
 \end{aligned}$$

The estimation of the amount of income, personal tax and household expenditures is a part of human life value analysis. This method may not fully anticipate other incomes and needs that arise with the death of a person. An estimate of these additional concerns is obtained through a needs analysis approach.

Therefore, we incorporated social security benefit from the Employee's Provident Fund (EPF) and post death needs in the model to get the net income surplus or deficit.

$$\begin{aligned}
 PV(NI) &= PV(GI) + PV(EPF \text{ Savings})_h + PV(EPF \text{ Savings})_w - PV(\text{Household Debts}) \\
 &\quad - PV(\text{Funeral Expenses})
 \end{aligned}$$

7.4.2 Income Surplus or Deficit for the Widower

We used the same method to estimate the income surplus or deficit for the widower. The income and personal tax are calculated for each year until the widower's expected retirement age, while the expenses are calculated for each year until the widow's expected age of death. The social security benefit from the Employee's Provident Fund (EPF) for both husband and wife; and post death needs are also estimated.

7.5 Assumptions in the Calculations

The assumptions in the analysis of income after death of the breadwinner are as follows:

- The analysis of income, personal taxes and expenditures are calculated using the method and assumptions as discussed in chapter 5 and 6.
- In estimating the household debts, we assumed that every mortgage protected by a Mortgage Reducing Term Assurance (MRTA) or other types of insurance;and hire-purchase financing for transport vehicles has been included in the average monthly expenditure per household and credit card is not a source for credit.
- Funeral expenses is RM5,000.
- Inflation rate at 3% per annum.

Chapter 8

Interpretation of Results

The primary function of life insurance is to cover the economic loss to a family caused by the death of the breadwinner.

A breadwinner's demand for life insurance depends on the demographic structure of his household. In Malaysia, generally the breadwinner is the husband and the beneficiaries are his wife and children. Lewis (1989) viewed the demand for life insurance from the perspective of the beneficiaries – life insurance is chosen to maximise the beneficiaries' expected lifetime utility.

In this research, a revision method of life-cycle modeling has been developed to determine the amount of life insurance required to protect the family against economic loss in the event of the breadwinner's death. To this end, we suggest a proper amount of life insurance coverage in a multiple of current annual income that can be used in the life insurance selling industry or as an underwriting guideline.

This chapter also summarises the results and discusses the application of the revision method in the life insurance industry – in life insurance selling and underwriting; and also in the analysis of economic damages in matters involving personal injury and wrongful death.

8.1 Life Insurance Needs of Married Men

The accompanying tables and example of computations in Appendix 3; and the summary in table 8.1 shows the amount of life insurance needed to maintain the family's standard of living after death of the breadwinner according to age and monthly salary for the three major races in Malaysia

Table 8.1: The Amount of Life Insurance Needs in a Multiple of Current Income for Married Men, by Race and Income

Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	-	-	-	-	-	-	-	-	-
25	39	46	49	32	38	41	22	25	28
30	29	34	36	25	29	31	18	20	22
35	25	28	29	21	23	24	14	15	16
40	17	22	23	14	18	19	9	11	12
45	10	18	19	8	14	15	5	7	8

Note: The median ages at first marriage for married men are 24 for Malays and, 25 for Chinese and Indians. Thus, we assume all men are still unmarried at the age of 20.

Figure 8.1, 8.2 and 3.3 illustrate the results.

Figure 8.1: The Amount of Life Insurance Needs in a Multiple of Current Income

For Malay Married Men According to Monthly Income

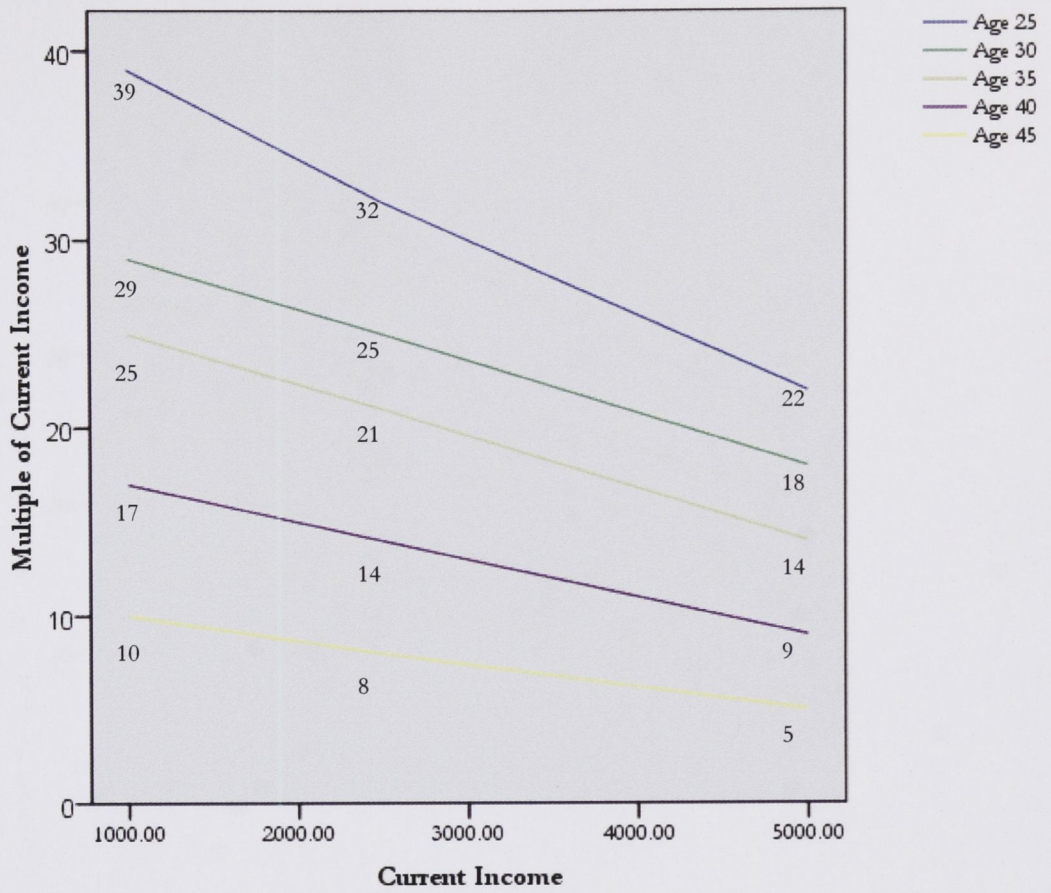


Figure 8.2: The Amount of Life Insurance Needs in a Multiple of Current Income

for Chinese Married Men According to Monthly Income

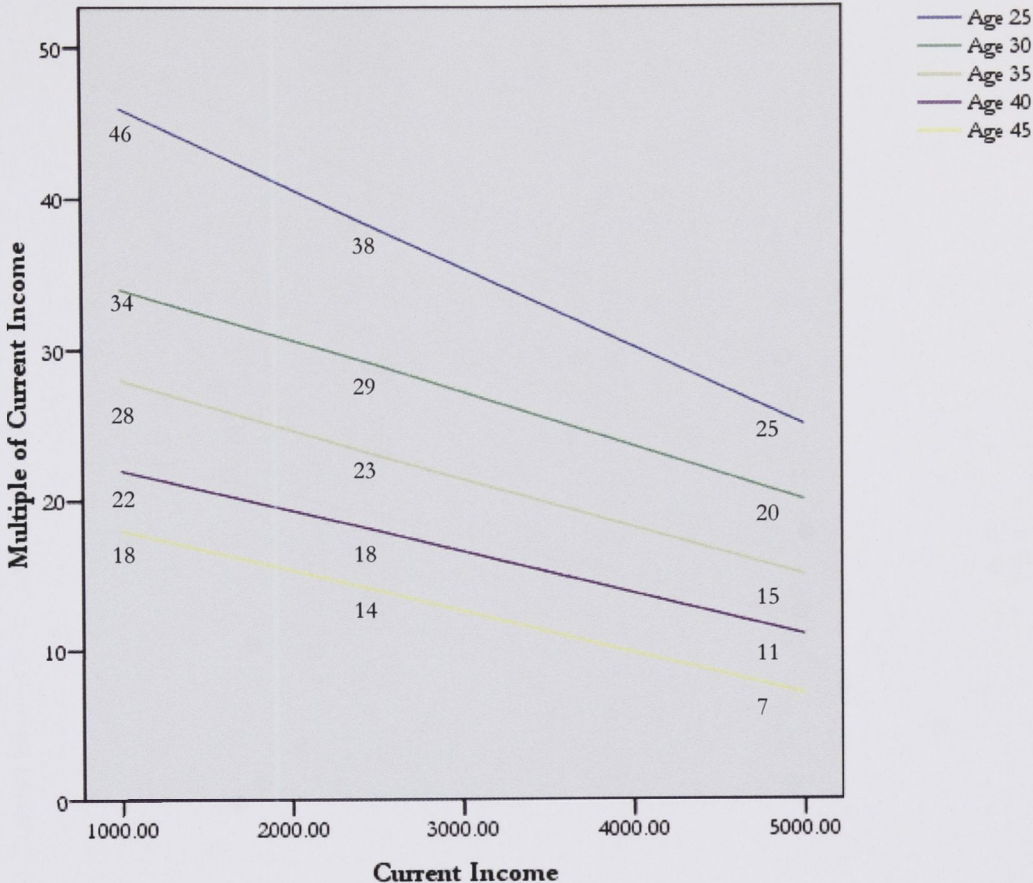
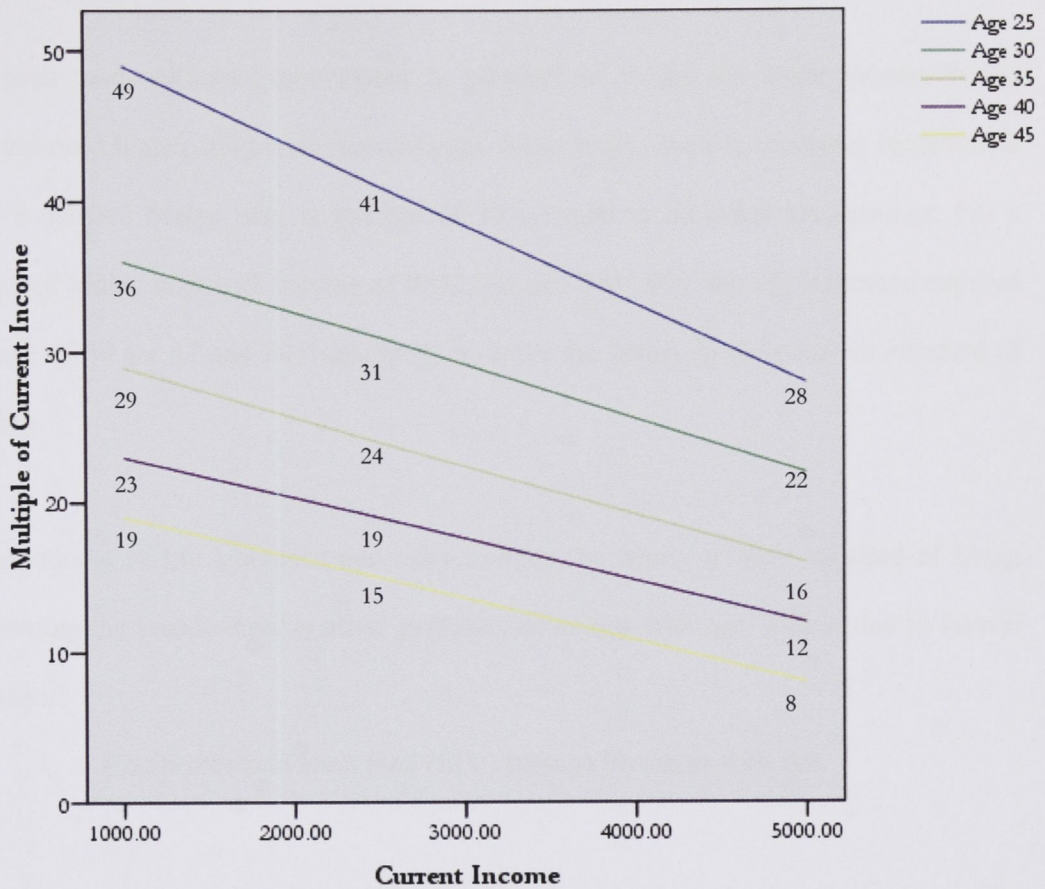


Figure 8.3: The Amount of Life Insurance Needs in a Multiple of Current Income

for Indian Married Men According to Monthly Income



From table 8.1 and figures 8.1, 8.2 and 8.3 illustrating the patterns of the amount of life insurance needs in a multiple of current income, the results show that for all ages and income level, a Malay family has lower life insurance needs when compared to other races in Malaysia. This is due to lower children education costs for Malays as *Bumiputra* than other races

Indian men need a slightly higher life insurance cover than the Chinese. This is because of a bigger age gap between Indian husband and wife. The bigger the age gap means the

longer the wife lives and the higher the continuing income should be provided until the wife's expected age of death.

In each case, without improvement in standard of living, the lower income family would need higher life insurance coverage, for example, the life insurance requirement for a married Malay man at the age of 30 is equal to 30 times his earnings. For a married Malay man with income of RM2,500 and RM5,000, the life insurance required at age of 30 are 27 and 20 respectively to leave the family in their current standard of living.

The amount of life insurance necessary to keep the family in their standard of living assuming the breadwinner is alive, generally decreases with age. This is due to several reasons:

1. Employees provident fund (EPF) savings increases with age.
2. The analysis of revision method is a projection of net contribution in the current year into the future. The level of expenses depends on the number of dependant children the person has to look after. Once children leave home, their consumption is no longer taken into account.

8.2 Life Insurance Needs of Unmarried Men

The single man is not likely to remain single. Family life-cycle will see him get married and become a father. When he acquires these responsibilities, he will need life insurance to provide an income protection to his family if he dies prematurely.

As in sub-section 8.1, we show the results on the amount of life insurance needs in a multiple of income for unmarried men according to age and monthly salary for Malays, Chinese and Indians.

Table 8.2: The Amount of Life Insurance Needs in a Multiple of Current Income for Unmarried Men, by Races and Monthly Income

Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	45	44	52	39	36	44	28	24	30
25	38	43	43	32	35	35	22	23	23
30	36	39	39	30	32	32	20	21	21
35	30	14	34	26	11	29	19	7	20
40	25	12	24	21	9	19	14	5	12
45	23	10	11	19	7	8	12	3	4

Figure 8.4, 8.5 and 8.6 illustrate the results.

Figure 8.4: The Amount of Life Insurance Needs in a Multiple of Current Income

for Malay Unmarried Men According to Monthly Income

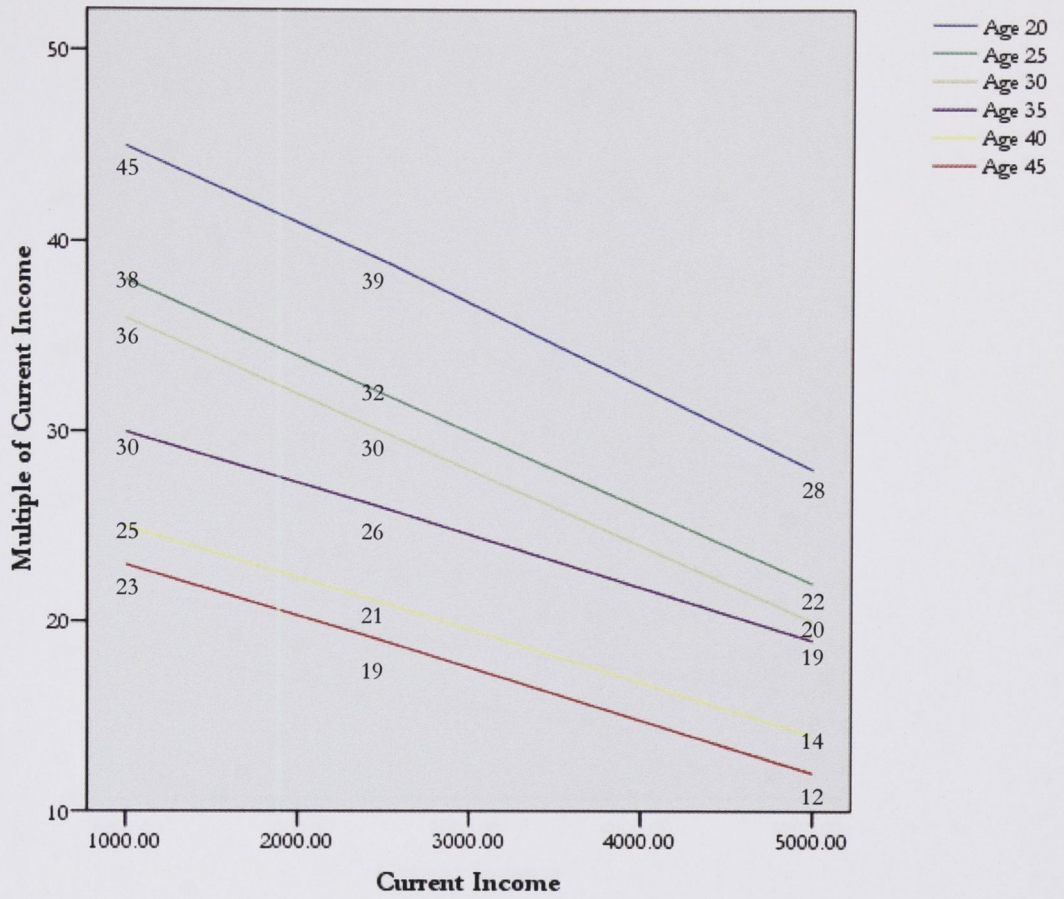


Figure 8.5: The Amount of Life Insurance Needs in a Multiple of Current Income for Chinese Unmarried Men According to Monthly Income

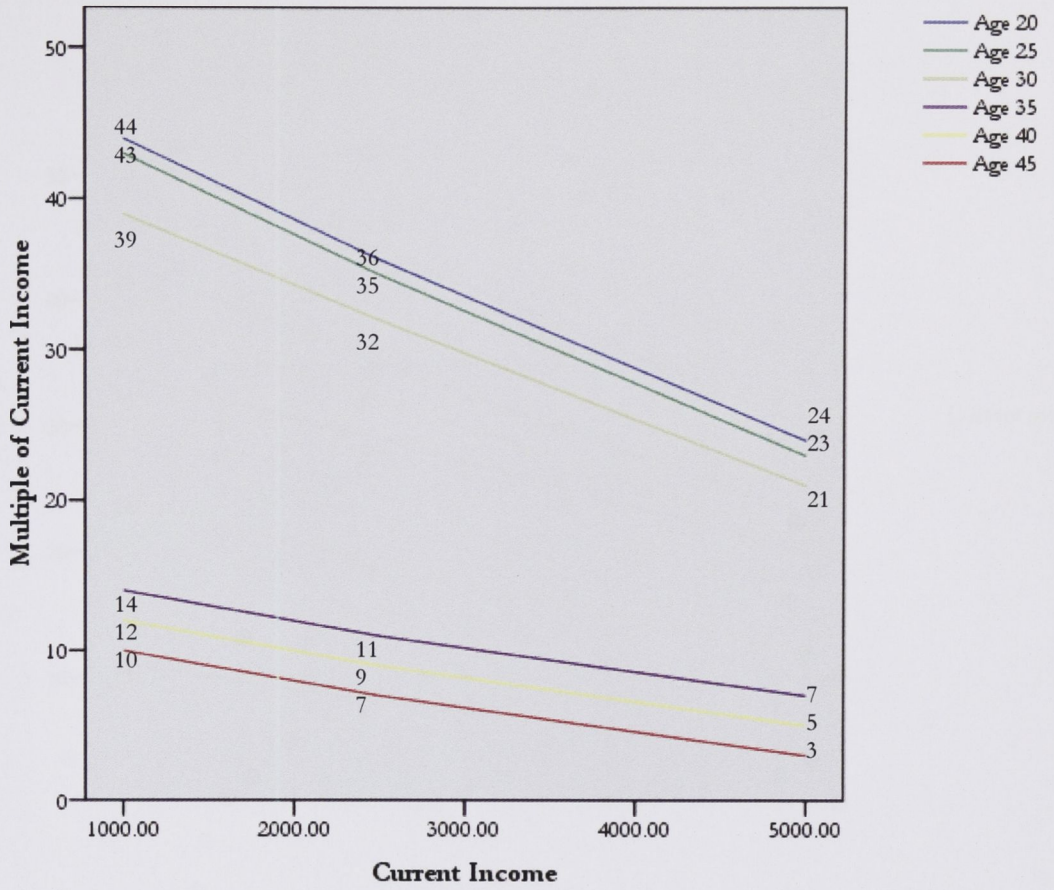
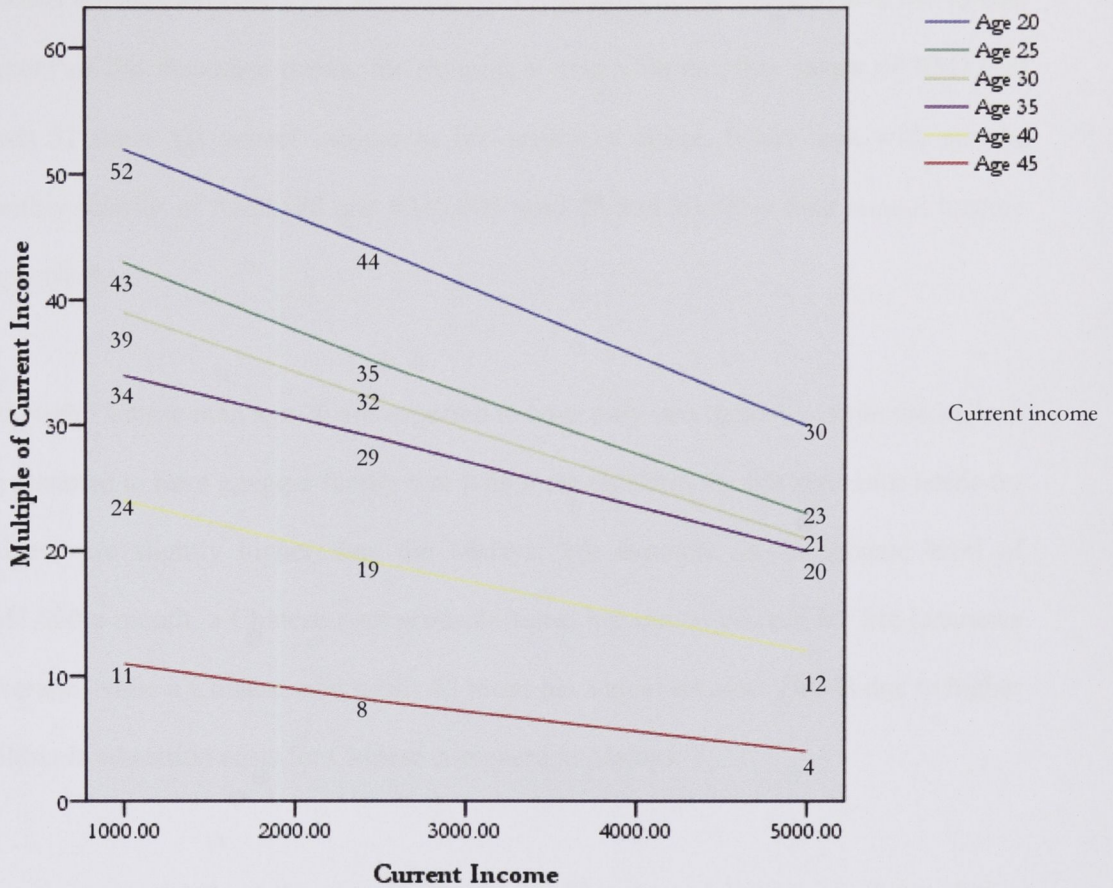


Figure 8.6: The Amount of Life Insurance Needs in a Multiple of Current Income
for Indian Married Men According to Monthly Income



In this research, we assume unmarried Malay men age 20 will be getting married at the age of 26 (wife's age of 21) and have three children; while unmarried Chinese men age 20 will be getting married at the age of 28 (wife's age of 25) and only have two children. The Indian men age 20 have almost similar first marriage and fertility patterns with the Malays. There are assume to be married at the age of 26 (wife's age of 21) and have three children.

The Indians have larger households of five, resulting in the larger amount of life insurance needs due to the higher consumption level of each of the family members and children's education costs. For all income level at age 20, the Indians have the largest amount of life insurance needs, for example a man with monthly salary of RM1,000 needs 52 times his annual income as life insurance cover. While men with current monthly salaries of RM2,500 and RM5,000 need 44 and 30 times their annual income respectively.

Although Chinese men age 20 are expected to have only two children, while the Malays are assumed to have a bigger family size with three children, the life insurance needs for Chinese are slightly higher than the Malays. For example, at an income level of RM1,000 a month, a Chinese man needs 44 times his annual income for life insurance coverage, while a Chinese man needs 43 times his annual income. This is due to higher children's education costs for Chinese compared to Malays.

For all income levels at the ages of 25 and 30, Chinese and Indian men have similar amounts of life insurance needs since both of them are assumed to have 2 children and similar marriage age gap between husband and wife. The Malays with similar family size of 2 children have a lower life insurance need since the education cost for them is much lower.

Chinese men age 35 and above are assumed to be childless. Thus, the life insurance needs for them is lower. The pattern is somewhat different for Malay and Indian men. Indians with higher children's education costs need more life insurance coverage than the Malays. At age 40, the difference in life insurance needs between Malays and

Indians are relatively close. Both are assumed to have two children but the age gap between husband and wife for Malays is larger and more life insurance coverage is needed. This makes the amount of life insurance needs for Indians and Malays at age 40 closer even though the children's education cost for them is lower than the Indians.

At age 45, Chinese and Indians are assumed to be childless, while Malays are expected to have one child. Therefore, the life insurance needs for Malays at age 45 is higher than the Chinese and Indians.

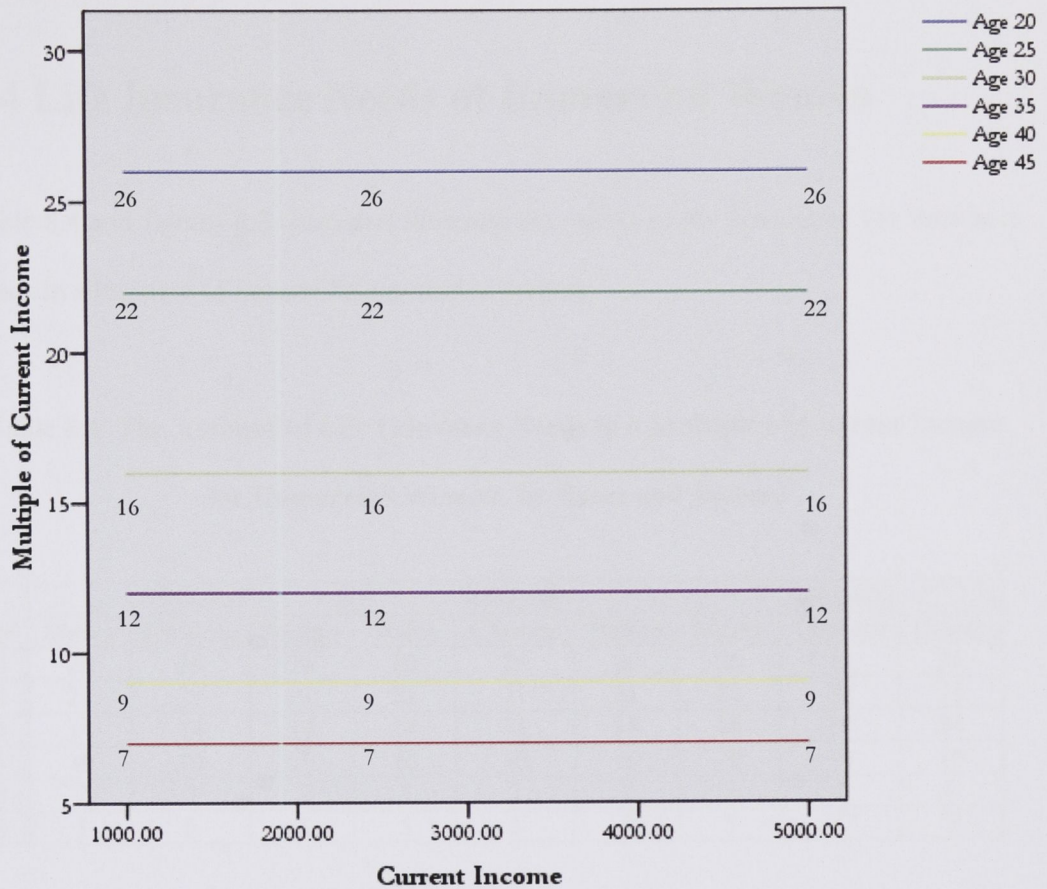
8.3 Life Insurance Needs of Married Women

Although the husband holds the responsibility for support and maintenance of a family, a life insurance coverage is still needed for women to protect the loss of income in the event of premature death or disability. Ideally, the life of each productive member of society should be insured. Table 8.3 and figures 8.7 show and illustrate the results on the amount of life insurance needs in a multiple of income for married women according to age and monthly salary for Malays, Chinese and Indians.

Table 8.3: The Amount of Life Insurance Needs in a Multiple of Current Income for Unmarried Women, by Race and Income

Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	26	26	26	26	26	26	26	26	26
25	22	22	22	22	22	22	22	22	22
30	16	16	16	16	16	16	16	16	16
35	12	12	12	12	12	12	12	12	12
40	9	9	9	9	9	9	9	9	9
45	7	7	7	7	7	7	7	7	7

Figure 8.7: The Amount of Life Insurance Needs in a Multiple of Current Income for Malay, Chinese and Indian Married Women According to Monthly Income



For each age, the amount of life insurance needs for married women is constant regardless of how much income they earn. For married women, the estimation of the amount of life insurance needs involves only the projection of her personal earnings for each year from her current age to the date of retirement, taking into account the trend of earnings and inflation. There is no reduction for the cost of personal expenditure as it is under her husband's responsibility. Therefore, the amount of life insurance needs for married women solely depends on the projection of future income.

The results also show that as the woman's age increases, the needs for life insurance is decreases.

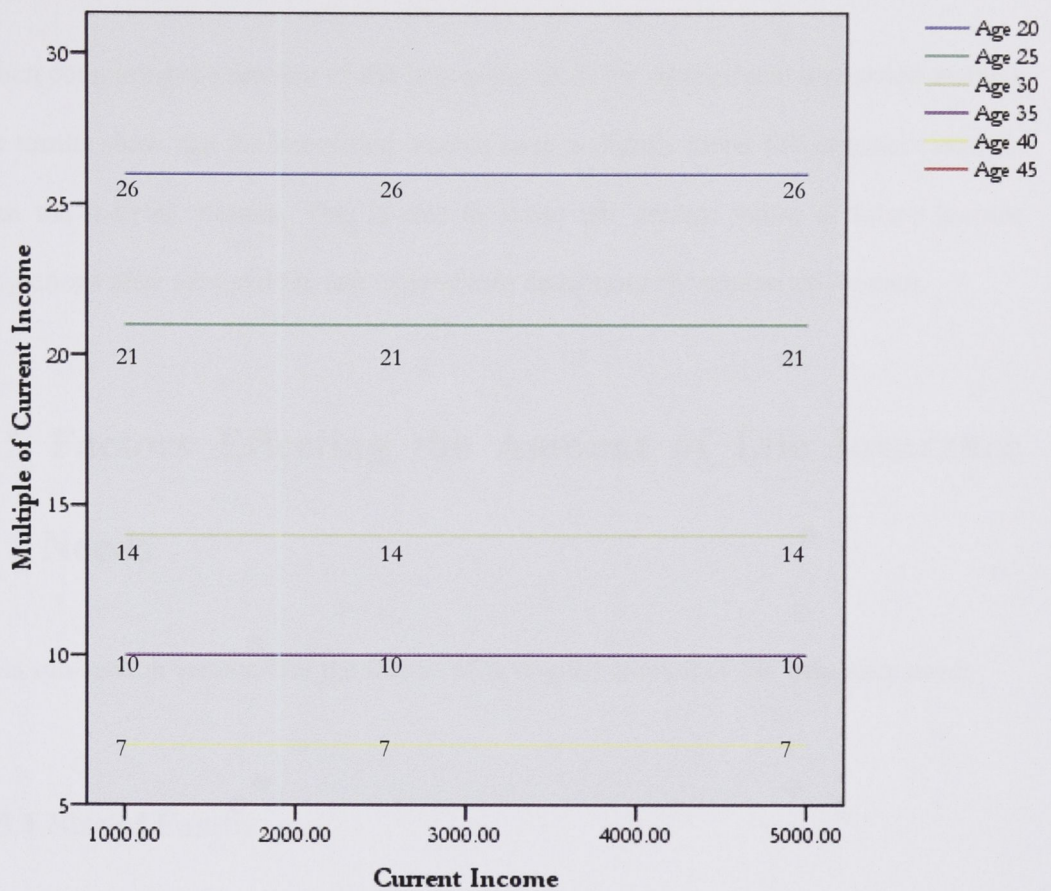
8.4 Life Insurance Needs of Unmarried Women

Table 8.4 and figures 8.8 show and illustrate the results of the amount of life insurance needs in a multiple of income for unmarried women.

Table 8.4: The Amount of Life Insurance Needs in a Multiple of Current Income for Unmarried Women, by Races and Income

Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	26	26	26	26	26	26	26	26	26
25	21	21	21	21	21	21	21	21	21
30	14	14	14	14	14	14	14	14	14
35	10	10	10	10	10	10	10	10	10
40	7	7	7	7	7	7	7	7	7
45	5	5	5	5	5	5	5	5	5

Figure 8.8: The Amount of Life Insurance Needs in a Multiple of Current Income for Malay, Chinese and Indian Unmarried Women According to Monthly Income



The amount of life insurance needs for unmarried women shows a similar pattern with married women as discussed above in sub-section 8.3, where the multiplication is constant regardless of the amount of income earned by the women.

The estimation of the amount of life insurance needs by the women is based on the projection of her future earnings for each year from current age to retirement. While the women are still unmarried, the cost of self-maintenance and personal income tax are deducted for each year. However, when the woman gets married, the expenditure cost is

her husband's responsibility, not heir's. Hence, it's not taken into account in estimating the amount of life insurance needs.

When comparing the amount of life insurance needs for married and unmarried women, the results show that the unmarried women need a slightly lower life insurance amount than the married women. This is due to lower net present value of future income projections after personal tax and expenditure deductions for unmarried women.

8.5 Factors Effecting the Amount of Life Insurance Needs

This sub-section summarises the factors affecting the amount of life insurance needs.

8.5.1 Size of Family

The characteristics and size of the family is the main factor in determining the amount of life insurance needs. The life-cycle models developed in this research do give a clear indication of the relationship between family size and life insurance required to be purchased. Therefore, we can conclude that the number of family members has a positive relationship with amount of life insurance needs.

This is consistent with other research findings such as a study by Hammond (1967) and, Burnett and Palmer (1984) confirmed that the demand on the amount of life insurance is related to the dependency ratio. Lewis (1989) also revealed that household income and number of children are positively related to life insurance ownership.

8.5.2 Age of Head of Household

Life insurance products are mainly purchased to protect family from loss of income due to premature death of the breadwinner before a certain retirement age. As a breadwinner gets older or nears retirement, the amount of EPF (Employee Provident Fund) savings gets higher. Upon death of the breadwinner, the EPF savings can be withdrawn by the widow and these savings may reduce the amount of life insurance needs.

Therefore, the age of the head of household should be negatively related to the amount of life insurance required to be purchased.

8.5.3 Age Gap between Husband and Wife

The amount of life insurance required increases with a bigger age gap between husband and wife. The longer the wife lives, the higher the continuing income should be provided until the wife's expected age of death. Therefore, a greater amount of life insurance is needed to safeguard the spouse and the children against the premature death of the breadwinner. This implies a positive relationship between the amount of life insurance ownership of a person and the age of his spouse.

8.6 Model Results and Comparison with Current Methods

In this section, we carry out a comparison on the amount of life insurance recommendations by this model with current methods that has been used and

recommended by forty life insurance agents and financial advisers as discussed in subsection 2.5.3.

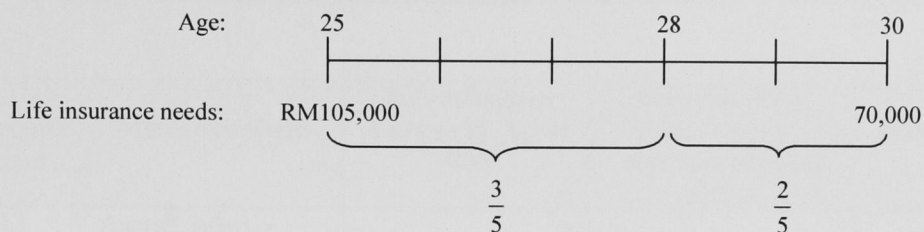
We used the same customer financial and personal profile for the purpose of this comparison.

- A single Malay woman age 28 earns RM60,000 annually.
- Estimated retirement at age 55.
- Total assets of RM170,000.
- Total liabilities of RM150,000.
- The woman does not have any life insurance coverage.
- The insurance agents and financial advisers provide other information required such as estimated interest rate, estimated rate of inflation, employee provident fund's contribution rate and funeral cost.

From table 8.4 above, an unmarried Malay woman currently age 25 and current income of RM5,000 may needs life insurance coverage for RM105,000, which is 21 times of current income. For an unmarried Malay woman age 30 with similar current income of RM5,000 needs RM70,000, which is 14 times of current income.

Figure 8.9 illustrates the model of life insurance needs for a single Malay woman age 28 as in this example.

Figure 8.9: Model of Life Insurance Needs for a Single Malay Woman Age 28



Therefore, the life insurance needs for a single Malay woman age 28 earns RM60,000 annually (equivalent to RM5,000 a month) in this example is as follows:

$$\begin{aligned} \text{Life Insurance needs} &= 105,000\left(\frac{3}{5}\right) + 70,000\left(\frac{2}{5}\right) \\ &= \text{RM91,000} \end{aligned}$$

We compare the amount above with recommendation amount of life insurance by forty Malaysian life insurance agents and financial advisers as in table 2.3.

Table 8.5: Model Results and Comparison with Life Insurance Recommendations by Forty Malaysian Life Insurance Agents and Financial Advisers

Insurance Agent	Method or Tools	Recommended Amount by Agent (RM)	Recommended Amount by Revision Method (RM)	Difference
1	5 x Annual Income	300,000	91,000	209,000
2	Net Worth Analysis	200,000	91,000	109,000
3	10 x Annual Income	600,000	91,000	509,000
4	Annual Salary x Year to Retirement	1,620,000	91,000	1,529,000
5	10 x Annual Income	600,000	91,000	509,000
6	Needs Analysis	174,090	91,000	83,090
7	10 x Annual Income	600,000	91,000	509,000
8	Net Worth Analysis	200,000	91,000	109,000
9	Needs Analysis	1,000,000	91,000	909,000
10	Needs Analysis	275,550	91,000	184,550
11	5 x Annual Income	300,000	91,000	209,000
12	Needs Analysis	250,000	91,000	159,000

Table 8.5: Model Results and Comparison with Life Insurance Recommendations

by Forty Malaysian Life Insurance Agents and Financial Advisers (cont.)

Insurance Agent	Method or Tools	Recommended Amount by Agent (RM)	Recommended Amount by Revision Method (RM)	Difference
13	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000
14	10 \times Annual Income	600,000	91,000	509,000
15	15 \times Annual Income	900,000	91,000	809,000
16	10 \times Annual Income	600,000	91,000	509,000
17	Needs Analysis	500,000	91,000	409,000
18	3 \times Annual Income	180,000	91,000	89,000
19	10 \times Annual Income	600,000	91,000	509,000
20	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000
21	5 \times Annual Income	300,000	91,000	209,000
22	5 \times Annual Income	300,000	91,000	209,000
23	Needs Analysis	385,769	91,000	294,769
24	10 \times Annual Income	600,000	91,000	509,000
25	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000
26	5 \times Annual Income	300,000	91,000	209,000
27	Income Replacement	330,300	91,000	239,300
28	10 \times Annual Income	600,000	91,000	509,000
29	10 \times Annual Income	600,000	91,000	509,000
30	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000
31	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000
32	Needs Analysis	550,000	91,000	459,000
33	10 \times Annual Income	600,000	91,000	509,000
34	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000
35	5 \times Annual Income	300,000	91,000	209,000
36	10 \times Annual Income	600,000	91,000	509,000
37	Needs Analysis	385,769	91,000	294,769
38	10 \times Annual Income	600,000	91,000	509,000
39	Net Worth Analysis	180,000	91,000	89,000
40	Annual Salary \times Year to Retirement	1,620,000	91,000	1,529,000

The primary purpose of life insurance is to provide a source of financial support to families if the breadwinner dies. Although a husband is a breadwinner and holds the responsibility for support and maintenance of a family, a life insurance coverage is still

needed for women to protect the loss of income in the event of premature death or disability.

To determine life insurance needs for women, we measured a person's life by estimating her future earnings. It is the amount that her family is at risk of losing in future income should she dies today.

Table 8.5 above shows that life insurance recommendations by all forty life insurance agents and financial advisers in Malaysia are higher than the amount suggested by our life insurance model. The key to purchasing the right amount of life insurance is to have just enough coverage to meet a person needs. To be over insured can negatively affect a person budget by paying unnecessarily for higher premiums.

8.7 Model Summary

The model developed in this research minimises the number of information needed in fact-finding to decide how much life insurance need to be purchased by an individual life. Unlike most conventional methods involve fact-finding that requires an immense amount of customer's personal information and details, and their financial targets in the future; this revision method only require five important questions – current age, race, monthly salary, sex and marital status. With only five information required in the computations, this method also will shorten time for consultation.

This model is simple, but powerful enough to compute the amount of life insurance a person need to purchase.

Chapter 9

Summary and Conclusion

This Chapter summarises the findings of the research and draws some overall conclusions.

9.1 Summary

The main purpose of this research is to identify the strength and weakness of the life insurance sales tool currently used in practice and develop a scientific method as a correct solution and hence provide adequate protection to relate the amount of life insurance a person needs to carry to the real value of a person's earnings. The research combined two methods currently used in practice – the needs analysis and human life value, and with a few revisions, we developed a method of determining the amount of life insurance needs. A method that we name the 'Revision Method'.

The research first set up the problem descriptions, the significance of the study, methodology, the scope and limits of the study.

Chapter 2 of the thesis reviewed the relevant research literature on the area of human life value and needs analysis. The strengths and weaknesses of the methods are identified. The research also analysed the quality of online calculators in calculating life insurance recommendations. Then, the research continues to evaluate practices in the area of selling and proper advice by life insurance agents, brokers and financial advisers to customers under The Code of Good Practice for Life Insurance Agents (1998) in Malaysia.

Chapter 3 described the research design, methodology used, data sources and demographic background of Malaysia as a chosen country of the case study for the application of the revision method in this study. Malaysia with three distinct major races – Malays, Chinese and Indians; with their different cultural and socio-economic characteristics provide an opportunity for a comparative analysis of marriage patterns and family formulation; and finally to estimate the amount of life insurance needs within the context of one country.

In chapter 4 of the study, we developed a family life cycle model for Malays, Chinese and Indians following the definition by Carter and McGoldrick (1989). The analysis begins with the analysis of marriage, fertility, children rearing and education, retirement age and life expectancy.

The analysis of income and tax is discussed in chapter 5. The first section of the chapter analysed the individual income during his working lifetime. The projection of income includes the salary increment, promotional increases and annual bonus. The amount of Employees Provident Fund (EPF) savings also is estimated on retirement. The second

section of the chapter formulated the analysis of income tax using the existing tax tables and rules published by the Inland Revenue Department Malaysia. At the end of the chapter, we discussed the assumptions used in the analysis of income and tax.

The analysis continues with the estimation of household expenditure as discussed in chapter 6. The first section of the chapter analysed the personal expenditure of a person and his family using the 1998/99 Household Expenditure Survey data. The survey was conducted by the Department of Statistics Malaysia. The personal expenditure is divided into two categories, which are single adult and married couple. The second section of the chapter analysed the cost of raising a child in Malaysia that includes the estimation of children's personal expenditure and cost of children's education. At the end of the chapter, we discussed the assumption used in the analysis of expenditure.

Chapter 7 of the thesis analysed the potential sources of income for the family after death of the breadwinner as well as the expenditure and post death needs. From the analysis, we are estimating the amount of life insurance needs to maintain the family's current standard of living if the breadwinner dies today, and improvement of life that will be enjoyed by the family in the future should he still survive.

Finally, chapter 8 summarised the results and suggested a proper amount of life insurance coverage in a multiple of current annual income that can be used in life insurance selling industry or as an underwriting guideline. We produced a table for married men, unmarried men, married women and unmarried women by income level of RM1,000, RM2,500 and RM5,000 and age of 20, 25, 30, 35, 40 and 45. The table showed different life insurance amount recommendations for each race in Malaysia

namely Malays, Chinese and Indians. We also developed a regression equation to estimate values of life insurance needs according to age, monthly income, sex, marital status and race.

9.2 Summary of the Results

In this section, we summarise the results obtained in the thesis. Table 9.1 shows the summary of the results.

Table 9.1: The Amount of Life Insurance Needs in a Multiple of Current Income by Sex, Race, Income and Marital Status

Married Men									
Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	-	-	-	-	-	-	-	-	-
25	39	46	49	32	38	41	22	25	28
30	29	34	36	25	29	31	18	20	22
35	25	28	29	21	23	24	14	15	16
40	17	22	23	14	18	19	9	11	12
45	10	18	19	8	14	15	5	7	8
Unmarried Men									
Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	45	44	52	39	36	44	28	24	30
25	38	43	43	32	35	35	22	23	23
30	36	39	39	30	32	32	20	21	21
35	30	14	34	26	11	29	19	7	20
40	25	12	24	21	9	19	14	5	12
45	23	10	11	19	7	8	12	3	4

Table 9.1: The Amount of Life Insurance Needs in a Multiple of Current Income
by Sex, Race, Income and Marital Status (cont.)

Married Women									
Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	26	26	26	26	26	26	26	26	26
25	22	22	22	22	22	22	22	22	22
30	16	16	16	16	16	16	16	16	16
35	12	12	12	12	12	12	12	12	12
40	9	9	9	9	9	9	9	9	9
45	7	7	7	7	7	7	7	7	7
Unmarried Women									
Age	RM1,000			RM2,500			RM5,000		
	Malay	Chinese	Indian	Malay	Chinese	Indian	Malay	Chinese	Indian
20	26	26	26	26	26	26	26	26	26
25	21	21	21	21	21	21	21	21	21
30	14	14	14	14	14	14	14	14	14
35	10	10	10	10	10	10	10	10	10
40	7	7	7	7	7	7	7	7	7
45	5	5	5	5	5	5	5	5	5

9.3 Future Works

Since this research is a beginning of a new methodology that has been developed to estimate the amount of life insurance needs, there are many aspects that have to be examined and done in the future.

9.3.1 Computer Software Program could be Developed

A computer software program could be developed to determine the amount of life insurance needs using the Revision Method discussed in this research.

9.3.2 The Method Application to Other Countries

The Revision Method developed in this research is based on a Malaysian scenario. The methodology could be used in other countries with some changes on the family life cycle model and assumptions used in estimating the projection of income, tax, expenditure and post-death needs.

9.3.3 Life Insurance Product Design

Statistics of this kind can be applied usefully at a population level to determine overall population insurance needs. A potential area of future research would be to determine how a financial plan or insurance product design could be developed to enable insurance coverage to be varied as and when life events occur rather than establishing an insurance program upfront which anticipates population average insurance needs, albeit the particular demographic segment to which the individual belongs.

One example is the introduction of guaranteed future insurability benefits, which would enable a single person to insure himself or herself for a relatively modest amount but have the option to increase cover at the time of marriage and having children. This means that the insurance program can be tailored to the individual.

9.3.4 Retirement Planning

Life insurance planning is concerned principally with the situation arising through the loss of income to dependents when the breadwinner dies or is incapacitated. The family also faces a similar problem when its breadwinner reaches that period of life at which he must retire from his income-producing lifetime. At this stage, a person will be

concerned in most instances principally with himself and his dependents. Retirement income policies, for example annuities provide life insurance protection up to the retirement age and then guarantee a specific monthly income for the rest of life. Future research could be done to use the Revision Method for retirement planning.

9.3.5 Keyman Life Insurance

Keyman life insurance is purchased by a business on the life of a key person to ensure the business would have the funds to continue if that person died. In order to have an effective keyman insurance policy, a business needs to quantify how much the key person is worth to the company. With some changes, the Revision Method could be used in assessing how much keyman life insurance is appropriate to cover the cost of recruiting replacements or estimating the effect of profit if a keyman dies.

9.4 Conclusion

There are numerous methods to determine the amount of life insurance a person needs – it can be scientific or simplistic. The most simplistic method is the multiple of income method in which the life insurance needs should equal between 6 and 10 times of the current gross income of the proposed insured. This method misses a range of important factors such as family size, financial condition, social security and household expenses. It also ignores expected life changes and individual preferences about sustaining the standard of living after the breadwinner dies. And the question is does it make sense that the life insurance needs should increase linearly over time as family income rises? In addition, different life insurance agents or financial advisors suggest different multiples. This makes the calculation of a precise amount difficult.

The more scientific methods to determine the appropriate amount of life insurance are the capital needs analysis and human life value. According to John E. Scarborough in his article "the Balance of Life" (1999), the most commonly used sales tool is the capital needs analysis and human life value is the most agreed academic expression for the purpose of life insurance. However, there are some weaknesses of using both methods.

A needs analysis ignores future changes and only identifies needs of a family at the current situation. By ignoring these factors needs analysis would leave a person under-insured. Other than that, if a person sets a spending target too high for survivors, the method will generate a larger amount of life insurance than is appropriate. This will cost the person too much in life insurance coverage. If the spending target is set too low, the recommended amount will leave the person under-insured.

There are also weaknesses of using human life value alone as a life insurance selling tool. The human life value method does not take into consideration there may be a capital needed immediately upon the death of the breadwinner.

However, both methods can be improved with a few revisions. For example, the post death needs under the capital needs analysis must be revised to incorporate the reality that the family's standard of living changes over time. The projection of a changing standard of living is a part of human life value analysis.

Using the methods above that have been used in the life insurance industry as a sales tool, customers need to review their life insurance policies throughout the years on a

regular basis to ensure the coverage continues to meet their needs and stays current. Doing so becomes particularly important whenever they reach any of life's milestones. New additions in their life such as a spouse or the birth of a child make reviewing their policy a necessary component of planning the financial future. Thus, we created a method that already included the family cycle model to incorporate changes in every stage of life.

Therefore, this research combined both concepts and methods of human life value and needs analysis; and with a few revisions and life cycle modelling, we developed a new methodology to estimate the amount of life insurance needs for a person – a method we name “Revision Method”.

A case study method was selected for this research. We chose Malaysia's three major races namely Malays, Chinese and Indians as case studies for the application of the revision method since Malaysians are racially diverse with vastly different cultural and economic backgrounds. The phenomena arose from the different impacts of the history of each race in Malaysia as well as the government's policy. However, caution would be necessary when using the revision method in a real life financial planning situation as particular clients may not fit the ethnic stereotypes that apply across the population segment to which they are assigned. Nonetheless, this method deals with the population average demographic characteristics.

The revision method also takes the approach of projecting the average incidence of particular life events occurring across the population. Statistics of this kind can be applied usefully at a population level to determine the overall population insurance

needs. This could be a potential area of future research to determine how a financial plan or insurance product design could be developed to enable insurance coverage to be varied as and when life events occur, for example to develop insurance program that can be tailored to the individual. One example is the introduction of guaranteed future insurability benefits which would enable a single person to insure themselves for a relatively modest amount of life insurance but have the option to increase cover at the time of marriage, having a child and so on.

However, this research does have real life application, for example in the area of group insurance product design. Typically for a large employer, a default insurance program is established which provides benefit levels for average employees of appropriate ages and sexes. Benefit levels could be determined using this method so that insurance coverage is provided through the program at group rates, on average, would be sufficient.

Using Malaysia as a case study, we found that consumers did not like to disclose too much of their information and financial details to life insurance agents and financial advisers that currently use methods which involve much more fact-finding. Therefore, the table that has been constructed in this research can be used as a guideline on how much life insurance is needed for a person in a multiple of current income according to age, sex, racial group, marital status and income level. This is an alternative way to minimise the number of questions asked to potential customers in recommending the amount of life insurance that should be purchased.

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APPENDIX 1

Table A1-1: Life Insurance Recommendations by Fifty-five Online Life Insurance Calculators using Needs Analysis

No	Company / URL Name	Web Site	Analysis of Income				
			Income for Beneficiaries	Years of Income Provided	Investment Income and Assets	Social Security	Existing Life Insurance
1	A&E Insurance and Financial Services, L.L.C., US	www.brianlsmith.com	60,000.00	20	X	X	X
2	About Life Insurance, UK	www.about-lifeinsurance.co.uk	60,000.00	20	20,000.00	20,000.00	0
3	AccuQuote, US	www.accuquote.com	60,000.00	20	X	X	X
4	ACME Insurance and Financial Services, Inc., US	www.acmequote.com	60,000.00	20	20,000.00	20,000.00	0
5	Advantage One Insurance and Financial Services, Inc., US	www.advantageoneinsurance.com	60,000.00	20	X	X	X
6	Advicenter Planning Group, US	www.advicenter.com	60,000.00	20	20,000.00	20,000.00	0
7	All Life Insurance Quotes, US	www.all-life-insurance-quotes.com	60,000.00	20	20,000.00	20,000.00	0
8	Broker Alliance Group Inc., US	www.insurancebag.com	60,000.00	20	20,000.00	20,000.00	0
9	Capital Plan, Inc., US	www.capitalplan.com	60,000.00	20	20,000.00	20000	X
10	Charles Schwab & Co., Inc., US	www.schwab.com	60,000.00	20	20,000.00	20,000.00	0
11	Chicago Life Insurance Analysis, Quotes and Policies, US	www.underwriter.com	60,000.00	20	X	X	X
12	Clark Family Pty Ltd., Australia	www.financialservicesonline.com.au	60,000.00	20	20,000.00	20,000.00	0
13	Connor Financial Corporation, Canada	www.cfc.dynip.com	60,000.00	X	20,000.00	20,000.00	0
14	Conseco, Inc., US	www.conseco.com	60,000.00	X	20,000.00	X	X
15	Countrywide Insurance Services, US	www.cwinsurance.com	60,000.00	20	20,000.00	20,000.00	0
16	Discount Life Insurance, US	www.discount-life-insurance.us	60,000.00	20	20,000.00	20,000.00	0
17	e.Insurance-Tools, US	www.einsurancetools.com	60,000.00	20	X	X	0
18	Essential Benefits Group, Canada	www.essentialbenefits.ca	60,000.00	20	20,000.00	20,000.00	0
19	FinAid Page, LLC., US	www.finaid.org	60,000.00	***30	X	X	X
20	FinanCenter, US	www.financenter.com	60,000.00	20	20,000.00	20,000.00	X
21	Financial Calculators, Inc., US	www.fincalc.com	60,000.00	20	20,000.00	20,000.00	0
22	Free Insurance Quotes, Canada	www.free-insurance-quotes.com	60,000.00	20	X	X	0
23	Garden State Life Insurance Company, US	www.gardenstatelife.com	60,000.00	20	20,000.00	20,000.00	0
24	GenAmerica Financial Corporation, US	www.genam.com	60,000.00	X	20,000.00	20,000.00	0
25	Gquote and Term Life Quotes Online, US	www.gquote.com	60,000.00	20	20,000.00	20,000.00	0
26	Illinois Mutual Life Insurance Company, US	life.illinoismutual.com	60,000.00	20	20,000.00	20,000.00	0
27	Independent Financial Concepts Group, Ltd., Canada	www.ifcg.com	60,000.00	20	20,000.00	20,000.00	0
28	InsuranceQuote Services Inc., US	www.iquote.com	60,000.00	X	20,000.00	20,000.00	0
29	Internet Insurance Services, Inc., US	www.for-quotes.com	60,000.00	20	20,000.00	X	0
30	iPipeline, US	www.ipipeline.com	60,000.00	20	20,000.00	20,000.00	0
31	Life Insurance Quotes, US	www.insurancecalculators.com	60,000.00	20	X	X	X
32	Life Saver Financial advisers, UK	www.life-saver.co.uk	60,000.00	20	20,000.00	20,000.00	0
33	Lifequotes Pty Ltd., Australia	www.lifequotes.com.au	60,000.00	20	X	X	0

Table A1-1: Life Insurance Recommendations by Fifty-five Online Life Insurance Calculators using Needs Analysis (cont.)

No	Tax	Analysis of Expenses				Inflation Rate	Investment Yield	Life Insurance Amount (USD)
		Debt Outstanding	Mortgage Outstanding	Final Expenses	Education Fund			
1	X	10,000.00	80,000.00	5,000.00	X	3.5	7.0	1,046,098.00
2	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,315,000.00
3	X	X	X	X	X	*4.0	*7.0	928,273.00
4	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	835,000.00
5	X	X	X	X	X	*4.0	*7.0	892,648.49
6	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	1,759,000.00
7	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,315,000.00
8	25%	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,330,000.00
9	X	X	X	5,000.00	60,000.00	X	X	1,225,000.00
10	X	10,000.00	80,000.00	X	60,000.00	X	X	1,310,000.00
11	X	X	X	X	X	3.5	7.0	977,000.00
12	25%	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	765,640.00
13	X	10,000.00	80,000.00	X	X	X	7.0	907,143.00
14	X	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	992,142.86
15	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,315,000.00
16	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	583,000.00
17	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,295,000.00
18	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	1,006,098.00
19	X	10,000.00	80,000.00	X	60,000.00	**3.6	7.0	1,140,000.00
20	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	1,849,346.00
21	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	1,006,000.00
22	X	10,000.00	80,000.00	5,000.00	X	3.5	7.0	986,098.00
23	X	10,000.00	80,000.00	5,000.00	X	3.5	7.0	1,438,760.76
24	X	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	972,142.00
25	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	553,000.00
26	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	992,658.00
27	X	10,000.00	80,000.00	5,000.00	X	*4.0	*7.0	987,648.00
28	X	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	985,142.86
29	X	10,000.00	80,000.00	5,000.00	60,000.00	*4.0	*7.0	1,027,648.00
30	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	835,000.00
31	X	X	X	X	X	*4.0	*7.0	892,648.00
32	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,315,000.00
33	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,370,000.00

Table A1-1: Life Insurance Recommendations by Fifty-five Online Life Insurance Calculators using Needs Analysis (cont.)

No	Company / URL Name	Web Site	Analysis of Income				
			Income for Beneficiaries	Years of Income Provided	Investment Income and Assets	Social Security	Existing Life Insurance
34	LifeStyle Financial Services, Australia	www.lifestyle.au.com	60,000.00	X	20,000.00	20,000.00	0
35	Manulife Financial, Canada	www.maritimelife.ca	60,000.00	20	20,000.00	20,000.00	0
36	North Coast Financial Services, Australia	www.ncib.com.au	60,000.00	20	X	X	0
37	Placer Insurance Agency, US	www.placerins.com	60,000.00	20	X	X	X
38	Planner, Canada	www.planner.ca	60,000.00	20	20,000.00	20,000.00	0
39	Professional Benefit Services, Inc., US	www.pbsbenefits.com	60,000.00	X	20,000.00	20,000.00	0
40	Prudential Financial, Inc., US	www.prudential.com	60,000.00	20	20,000.00	20,000.00	0
41	Reinke & Associates, Inc., US	www.reinkeassoc.com	60,000.00	X	20,000.00	20,000.00	0
42	ReliaQuote, Inc., US	www.reliaquote.com	60,000.00	20	20,000.00	20,000.00	0
43	S.W.I., Inc., US	www.lowcostlifeinsurance.com	60,000.00	20	X	X	X
44	Smartmoney, US	www.smartmoney.com	60,000.00	20	20,000.00	20,000.00	0
45	SMF Funds Management Ltd., Australia	www.smf.com.au	60,000.00	20	20,000.00	20,000.00	0
46	Sovereign, New Zealand	www.sovereign.co.nz	60,000.00	20	20,000.00	20,000.00	0
47	Stebbings and Sohl Insurance, US	www.stebbingsandsohl.com	60,000.00	X	X	20,000.00	0
48	TD Group Financial Services, Canada	www.tdcanadatrust.com	60,000.00	20	20,000.00	20,000.00	0
49	The Horace Mann Companies, US	www.horacemann.com	60,000.00	X	X	X	0
50	The Insurance Watch, Australia	www.insurancewatch.com.au	60,000.00	20	20,000.00	20,000.00	X
51	The Life and Health Insurance Foundation for Education, US	www.life-line.org	60,000.00	20	20,000.00	20,000.00	0
52	The Savings Bank Life Insurance Company of Massachusetts, US	www.sbli.com	60,000.00	X	X	20,000.00	0
53	William J. Afryl Agency, Inc., US	www.bafryl.com	60,000.00	20	20,000.00	20,000.00	X

Table A1-1: Life Insurance Recommendations by Fifty-five Online Life Insurance Calculators using Needs Analysis (cont.)

No	Tax	Analysis of Expenses				Inflation Rate	Investment Yield	Life Insurance Amount (USD)
		Debt Outstanding	Mortgage Outstanding	Final Expenses	Education Fund			
34	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,315,000.00
35	25%	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	885,570.36
36	X	10,000.00	80,000.00	X	60,000.00	X	X	1,650,000.00
37	X	X	X	X	X	*4.0	*7.0	892,648.49
38	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	1,012,658.00
39	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	X	1,277,857.00
40	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	920,200.00
41	X	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	857,142.86
42	X	10,000.00	80,000.00	5,000.00	60,000.00	*4.0	*7.0	1,043,272.00
43	X	X	X	X	X	*4.0	*7.0	892,648.49
44	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,115,000.00
45	X	10,000.00	80,000.00	5,000.00	60,000.00	*4.0	*7.0	915,161.00
46	X	10,000.00	80,000.00	5,000.00	60,000.00	X	7.0	795,136.00
47	X	10,000.00	80,000.00	X	60,000.00	X	X	5,495,000.00
48	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	905,800.00
49	X	X	80,000.00	5,000.00	X	X	X	1,345,000.00
50	X	10,000.00	80,000.00	X	60,000.00	3.5	7.0	962,486.00
51	X	10,000.00	80,000.00	5,000.00	60,000.00	3.5	7.0	1,006,097.00
52	X	X	X	5,000.00	60,000.00	X	X	651,667.00
53	X	10,000.00	80,000.00	5,000.00	60,000.00	X	X	1,315,000.00

Table A1-2: Life Insurance Recommendations by Fifty-five Online Life Insurance Calculators using Human Life Value

No	Company / URL Name	Age	Retirement Age	Annual Income	Tax	Spouse's Age	Spouse's Annual Income	Family Expenses	Ages of Children	Investment Yield	Income growth	Life Insurance Amount (USD)
54	The Life and Health Insurance Foundation, US www.life-line.org	35	65	60,000.00	X	35	0	X	15 and 10	X	X	1,683,471.00
55	Illinois Mutual Life Insurance Company, US life.illinoismutual.com	35	65	60,000.00	25%	X	X	36,000.00	X	7.0	4%	184,229.67

* Combo box for input. There are no option for inflation rate of 3.5 in these calculators.

** Inflation adjusted at 3.6

*** This calculator assumes insurance needed until retirement age at age 65. Therefore, the number of years of income provided is 30.

**** This calculator suggests life insurance cover at least \$750,000 and preferably \$1,140,000.00

APPENDIX 2

Table A2-1: Nuptiality Table for Malay Men in Malaysia

Age x	n_x	1000 q_x	S_x	M_x	E_x	C_x	T_x	PRE(x)	e_x^o	Age at marriage
14	0.00070	1.44	100,000	70	98,625	99965	1184411	0.9862	11.8	25.8
15	0.00140	1.44	99,930	140	98,555	99860	1084446	0.9862	10.8	25.8
16	0.00430	1.48	99,790	429	98,415	99576	984586	0.9862	9.8	25.8
17	0.00790	1.54	99,361	785	97,986	98969	885010	0.9862	8.8	25.8
18	0.02140	1.63	98,576	2,110	97,201	97521	786042	0.9860	7.8	25.8
19	0.03390	1.76	96,467	3,270	95,091	94831	688521	0.9857	7.0	26.0
20	0.05590	1.90	93,196	5,210	91,821	90591	593689	0.9852	6.3	26.3
21	0.07610	2.07	87,987	6,696	86,611	84639	503098	0.9844	5.7	26.7
22	0.09420	2.19	81,291	7,658	79,916	77462	418459	0.9831	5.2	27.2
23	0.12990	2.18	73,633	9,565	72,258	68851	340997	0.9813	4.7	27.7
24	0.19720	2.11	64,068	12,634	62,693	57751	272146	0.9785	4.5	28.5
25	0.21940	2.04	51,434	11,285	50,059	45792	214395	0.9733	4.5	29.5
26	0.23890	1.98	40,149	9,592	38,774	35354	168603	0.9657	4.6	30.6
27	0.25790	1.92	30,558	7,881	29,182	26617	133250	0.9550	4.9	31.9
28	0.26070	1.87	22,677	5,912	21,302	19721	106632	0.9394	5.4	33.4
29	0.26600	1.82	16,765	4,459	15,390	14535	86911	0.9180	6.1	35.1
30	0.25920	1.78	12,306	3,190	10,930	10711	72376	0.8882	7.0	37.0
31	0.19240	1.77	9,116	1,754	7,741	8239	61666	0.8491	7.9	38.9
32	0.15490	1.79	7,362	1,140	5,987	6792	53427	0.8132	8.5	40.5
33	0.15120	1.85	6,222	941	4,846	5751	46635	0.7790	8.9	41.9
34	0.08860	1.93	5,281	468	3,906	5047	40883	0.7396	8.9	42.9
35	0.08720	2.02	4,813	420	3,438	4603	35836	0.7143	8.6	43.6
36	0.11790	2.14	4,393	518	3,018	4134	31233	0.6870	8.5	44.5
37	0.08940	2.26	3,875	346	2,500	3702	27099	0.6451	8.3	45.3
38	0.11880	2.39	3,529	419	2,154	3319	23397	0.6103	8.1	46.1
39	0.08840	2.54	3,110	275	1,734	2972	20077	0.5577	7.9	46.9
40	0.15750	2.72	2,835	446	1,459	2612	17105	0.5149	8.0	48.0
41	0.06720	2.93	2,388	160	1,013	2308	14494	0.4242	7.4	48.4
42	0.07210	3.19	2,228	161	853	2147	12186	0.3827	6.8	48.8
43	0.09900	3.49	2,067	205	692	1965	10038	0.3347	6.1	49.1
44	0.04120	3.83	1,863	77	487	1824	8073	0.2616	5.4	49.4
45	0.05430	4.19	1,786	97	411	1737	6249	0.2299	4.5	49.5
46	0.09520	4.60	1,689	161	314	1608	4512	0.1857	3.7	49.7
47	0.05000	5.05	1,528	76	153	1490	2903	0.1000	2.8	49.8
48	0.05260	5.52	1,452	76	76	1413	1413	0.0526	1.9	49.9

Table A2-2: Nuptiality Table for Chinese Men in Malaysia

Age x	n_x	1000 q_x	S_x	M_x	E_x	C_x	T_x	PRE(x)	e_x^o	Age at marriage
14	0.0000	1.44	100,000	0	95,734	100000	1390778	0.9573	13.9	27.9
15	0.0008	1.44	100,000	80	95,734	99960	1290778	0.9573	12.9	27.9
16	0.0000	1.48	99,920	0	95,654	99920	1190818	0.9573	11.9	27.9
17	0.0017	1.54	99,920	170	95,654	99835	1090898	0.9573	10.9	27.9
18	0.0094	1.63	99,750	938	95,484	99281	991063	0.9572	10.6	28.6
19	0.0182	1.76	98,812	1,798	94,547	97913	891782	0.9568	9.7	28.7
20	0.0323	1.90	97,014	3,134	92,748	95447	793869	0.9560	8.8	28.8
21	0.0559	2.07	93,881	5,248	89,615	91257	698421	0.9546	8.0	29.0
22	0.0656	2.19	88,633	5,814	84,367	85725	607165	0.9519	7.3	29.3
23	0.0962	2.18	82,818	7,967	78,553	78835	521439	0.9485	6.6	29.6
24	0.0878	2.11	74,851	6,572	70,585	71565	442604	0.9430	6.1	30.1
25	0.1558	2.04	68,279	10,638	64,014	62960	371039	0.9375	5.7	30.7
26	0.1944	1.98	57,641	11,205	53,376	52039	308079	0.9260	5.7	31.7
27	0.1850	1.92	46,436	8,591	42,170	42141	256040	0.9081	5.7	32.7
28	0.1897	1.87	37,845	7,179	33,579	34256	213900	0.8873	5.8	33.8
29	0.1927	1.82	30,666	5,909	26,400	27711	179644	0.8609	6.0	35.0
30	0.1776	1.78	24,757	4,397	20,491	22558	151933	0.8277	6.2	36.2
31	0.1969	1.77	20,360	4,009	16,094	18355	129375	0.7905	6.4	37.4
32	0.1493	1.79	16,351	2,441	12,085	15130	111019	0.7391	6.6	38.6
33	0.2701	1.85	13,910	3,757	9,644	12031	95889	0.6933	7.3	40.3
34	0.1600	1.93	10,153	1,624	5,887	9341	83857	0.5798	8.4	42.4
35	0.1029	2.02	8,528	878	4,263	8090	74517	0.4998	8.7	43.7
36	0.1148	2.14	7,651	878	3,385	7212	66427	0.4424	8.9	44.9
37	0.0991	2.26	6,772	671	2,507	6437	59216	0.3701	9.0	46.0
38	0.0777	2.39	6,101	474	1,836	5864	52779	0.3008	9.0	47.0
39	0.0404	2.54	5,627	227	1,361	5514	46915	0.2419	8.7	47.7
40	0.0645	2.72	5,400	348	1,134	5226	41401	0.2100	8.2	48.2
41	0.0568	2.93	5,052	287	786	4908	36175	0.1556	7.8	48.8
42	0.0353	3.19	4,765	168	499	4681	31267	0.1047	7.1	49.1
43	0.0000	3.49	4,596	0	331	4596	26586	0.0720	6.2	49.2
44	0.0241	3.83	4,596	111	331	4541	21990	0.0720	5.3	49.3
45	0.0122	4.19	4,486	55	220	4458	17449	0.0490	4.4	49.4
46	0.0123	4.60	4,431	55	165	4404	12991	0.0373	3.5	49.5
47	0.0253	5.05	4,376	111	111	4321	8587	0.0253	2.5	49.5
48	0.0000	5.52	4,266	0	0	4266	4266	0.0000	1.5	49.5

Table A2-3: Nuptiality Table for Indian Men in Malaysia

Age x	n_x	1000 q_x	S_x	M_x	E_x	C_x	T_x	PRE(x)	e_x^o	Age at marriage
14	0.0019	1.44	100,000	190	98,570	99905	1258561	0.9857	12.5	26.5
15	0.0019	1.44	99,810	190	98,380	99715	1158656	0.9857	11.6	26.6
16	0.0056	1.48	99,620	558	98,190	99341	1058941	0.9856	10.6	26.6
17	0.0114	1.54	99,062	1,129	97,632	98498	959599	0.9856	9.6	26.6
18	0.0154	1.63	97,933	1,508	96,503	97179	861101	0.9854	8.7	26.7
19	0.0421	1.76	96,425	4,059	94,995	94395	763922	0.9852	7.9	26.9
20	0.0505	1.90	92,366	4,664	90,935	90033	669527	0.9845	6.9	26.9
21	0.0463	2.07	87,701	4,061	86,271	85671	579494	0.9837	6.6	27.6
22	0.0887	2.19	83,640	7,419	82,210	79931	493823	0.9829	6.0	28.0
23	0.0888	2.18	76,222	6,768	74,791	72837	413892	0.9812	5.5	28.5
24	0.1166	2.11	69,453	8,098	68,023	65404	341055	0.9794	5.1	29.1
25	0.2206	2.04	61,355	13,535	59,925	54587	275651	0.9767	4.9	29.9
26	0.1757	1.98	47,820	8,402	46,390	43619	221063	0.9701	4.9	30.9
27	0.2383	1.92	39,418	9,393	37,988	34721	177444	0.9637	5.0	32.0
28	0.2452	1.87	30,025	7,362	28,594	26344	142723	0.9524	5.3	33.3
29	0.1923	1.82	22,663	4,358	21,232	20484	116379	0.9369	5.6	34.6
30	0.2381	1.78	18,305	4,358	16,874	16125	95896	0.9219	5.8	35.8
31	0.1538	1.77	13,946	2,145	12,516	12874	79770	0.8974	6.2	37.2
32	0.2133	1.79	11,801	2,517	10,371	10543	66896	0.8788	6.4	38.4
33	0.1029	1.85	9,284	955	7,854	8806	56354	0.8459	6.6	39.6
34	0.2143	1.93	8,329	1,785	6,899	7436	47547	0.8283	6.7	40.7
35	0.1200	2.02	6,544	785	5,114	6151	40111	0.7814	7.0	42.0
36	0.1905	2.14	5,759	1,097	4,328	5210	33959	0.7516	7.0	43.0
37	0.1667	2.26	4,662	777	3,231	4273	28749	0.6932	7.0	44.0
38	0.0909	2.39	3,885	353	2,454	3708	24476	0.6318	6.8	44.8
39	0.1786	2.54	3,531	631	2,101	3216	20768	0.5950	6.7	45.7
40	0.1667	2.72	2,901	484	1,470	2659	17552	0.5069	7.0	47.0
41	0.0435	2.93	2,417	105	987	2365	14893	0.4083	6.7	47.7
42	0.0455	3.19	2,312	105	882	2259	12529	0.3814	6.0	48.0
43	0.0476	3.49	2,207	105	777	2154	10269	0.3519	5.3	48.3
44	0.1667	3.83	2,102	350	672	1927	8115	0.3195	4.7	48.7
45	0.1250	4.19	1,751	219	321	1642	6188	0.1834	4.2	49.2
46	0.0000	4.60	1,532	0	102	1532	4546	0.0667	3.4	49.4
47	0.0000	5.05	1,532	0	102	1532	3014	0.0667	2.4	49.4
48	0.0667	5.52	1,532	102	102	1481	1481	0.0667	1.5	49.5

Table A2-4 – Nuptiality Table for Malays Women in Malaysia

Age x	n_x	1000 q_x	S_x	M_x	E_x	C_x	T_x	PRE(x)	e_x^o	Age at marriage
11	0.0004	1.56	100,000	40	98,923	99980	1012708	0.9892	10.1	21.1
12	0.0028	1.49	99,960	280	98,883	99820	912728	0.9892	9.1	21.1
13	0.0128	1.45	99,680	1,276	98,603	99042	812908	0.9892	8.2	21.2
14	0.0177	1.44	98,404	1,742	97,327	97533	713865	0.9891	7.3	21.3
15	0.0550	1.44	96,662	5,316	95,586	94004	616332	0.9889	6.4	21.4
16	0.0651	1.48	91,346	5,947	90,269	88373	522328	0.9882	5.8	21.8
17	0.1097	1.54	85,399	9,368	84,323	80715	433955	0.9874	5.3	22.3
18	0.1204	1.63	76,031	9,154	74,954	71454	353240	0.9858	4.8	22.8
19	0.1629	1.76	66,877	10,894	65,800	61430	281786	0.9839	4.4	23.4
20	0.1830	1.90	55,983	10,245	54,906	50860	220356	0.9808	4.2	24.2
21	0.2282	2.07	45,738	10,437	44,661	40519	169496	0.9765	4.0	25.0
22	0.2420	2.19	35,300	8,543	34,224	31029	128977	0.9695	4.0	26.0
23	0.2510	2.18	26,758	6,716	25,681	23400	97948	0.9598	4.0	27.0
24	0.3234	2.11	20,042	6,481	18,965	16801	74548	0.9463	4.3	28.3
25	0.3645	2.04	13,560	4,943	12,483	11089	57747	0.9206	5.1	30.1
26	0.3323	1.98	8,617	2,864	7,541	7186	46658	0.8751	6.4	32.4
27	0.2179	1.92	5,754	1,254	4,677	5127	39473	0.8129	7.8	34.8
28	0.2297	1.87	4,500	1,034	3,423	3983	34346	0.7607	8.8	36.8
29	0.1484	1.82	3,466	514	2,390	3209	30362	0.6894	9.8	38.8
30	0.1974	1.78	2,952	583	1,875	2661	27153	0.6353	10.6	40.6
31	0.0935	1.77	2,369	222	1,293	2259	24492	0.5455	11.3	42.3
32	0.0530	1.79	2,148	114	1,071	2091	22234	0.4987	11.1	43.1
33	0.1892	1.85	2,034	385	957	1842	20143	0.4706	11.4	44.4
34	0.0472	1.93	1,649	78	572	1610	18302	0.3471	11.6	45.6
35	0.0816	2.02	1,571	128	495	1507	16691	0.3147	11.4	46.4
36	0.0652	2.14	1,443	94	366	1396	15184	0.2539	11.2	47.2
37	0.0455	2.26	1,349	61	272	1318	13788	0.2018	10.9	47.9
38	0.0353	2.39	1,288	45	211	1265	12470	0.1638	10.4	48.4
39	0.0494	2.54	1,242	61	165	1211	11205	0.1332	9.7	48.7
40	0.0253	2.72	1,181	30	104	1166	9994	0.0881	9.0	49.0
41	0.0260	2.93	1,151	30	74	1136	8828	0.0644	8.2	49.2
42	0.0000	3.19	1,121	0	44	1121	7692	0.0395	7.3	49.3
43	0.0132	3.49	1,121	15	44	1114	6571	0.0395	6.4	49.4
44	0.0000	3.83	1,106	0	29	1106	5457	0.0266	5.5	49.5
45	0.0133	4.19	1,106	15	29	1099	4351	0.0266	4.5	49.5
46	0.0000	4.60	1,091	0	15	1091	3252	0.0135	3.5	49.5
47	0.0135	5.05	1,091	15	15	1084	2161	0.0135	2.5	49.5
48	0.0000	5.52	1,077	0	0	1077	1077	0.0000	1.5	49.5

Table A2-5: Nuptiality Table for Chinese Women in Malaysia

Age x	n_x	1000 q_x	S_x	M_x	E_x	C_x	T_x	PRE(x)	e_x^o	Age at marriage
11	0.0000	1.56	100,000	0	96,835	100000	1263631	0.9684	12.6	23.6
12	0.0000	1.49	100,000	0	96,835	100000	1163631	0.9684	11.6	23.6
13	0.0034	1.45	100,000	340	96,835	99830	1063631	0.9684	10.6	23.6
14	0.0043	1.44	99,660	429	96,495	99446	963801	0.9682	9.7	23.7
15	0.0182	1.44	99,231	1,806	96,067	98328	864355	0.9681	8.7	23.7
16	0.0249	1.48	97,425	2,426	94,261	96213	766027	0.9675	8.8	24.8
17	0.0466	1.54	95,000	4,427	91,835	92786	669814	0.9667	7.8	24.8
18	0.0603	1.63	90,573	5,462	87,408	87842	577028	0.9651	6.8	24.8
19	0.0847	1.76	85,111	7,209	81,946	81507	489187	0.9628	5.8	24.8
20	0.1187	1.90	77,902	9,247	74,737	73279	407680	0.9594	4.8	24.8
21	0.1632	2.07	68,655	11,205	65,490	63053	334401	0.9539	4.9	25.9
22	0.1546	2.19	57,451	8,882	54,286	53010	271348	0.9449	4.6	26.6
23	0.2200	2.18	48,569	10,685	45,404	43226	218339	0.9348	4.5	27.5
24	0.2295	2.11	37,884	8,694	34,719	33536	175113	0.9165	4.5	28.5
25	0.2508	2.04	29,189	7,321	26,025	25529	141576	0.8916	5.7	30.7
26	0.3031	1.98	21,869	6,628	18,704	18554	116047	0.8553	5.3	31.3
27	0.3730	1.92	15,240	5,685	12,075	12398	97493	0.7923	6.7	33.7
28	0.1935	1.87	9,556	1,849	6,391	8631	85095	0.6688	8.7	36.7
29	0.1742	1.82	7,707	1,342	4,542	7035	76463	0.5893	9.8	38.8
30	0.1579	1.78	6,364	1,005	3,199	5862	69428	0.5027	10.9	40.9
31	0.0962	1.77	5,359	516	2,194	5101	63566	0.4095	11.8	42.8
32	0.1064	1.79	4,844	515	1,679	4586	58465	0.3466	12.3	44.3
33	0.1059	1.85	4,328	458	1,163	4099	53879	0.2688	12.9	45.9
34	0.0494	1.93	3,870	191	705	3774	49780	0.1822	12.2	46.2
35	0.0000	2.02	3,679	0	514	3679	46005	0.1397	11.9	46.9
36	0.0385	2.14	3,679	142	514	3608	42327	0.1397	11.9	47.9
37	0.0263	2.26	3,537	93	372	3491	38719	0.1053	11.3	48.3
38	0.0411	2.39	3,444	142	279	3373	35228	0.0811	10.7	48.7
39	0.0139	2.54	3,303	46	138	3280	31855	0.0417	10.0	49.0
40	0.0141	2.72	3,257	46	92	3234	28575	0.0282	9.2	49.2
41	0.0143	2.93	3,211	46	46	3188	25342	0.0143	8.4	49.4
42	0.0000	3.19	3,165	0	0	3165	22154	0.0000	7.4	49.4
43	0.0000	3.49	3,165	0	0	3165	18989	0.0000	6.4	49.4
44	0.0000	3.83	3,165	0	0	3165	15824	0.0000	5.5	49.5
45	0.0000	4.19	3,165	0	0	3165	12659	0.0000	4.5	49.5
46	0.0000	4.60	3,165	0	0	3165	9494	0.0000	3.5	49.5
47	0.0000	5.05	3,165	0	0	3165	6330	0.0000	2.5	49.5
48	0.0000	5.52	3,165	0	0	3165	3165	0.0000	1.5	49.5

Table A2-6: Nuptiality Table for Indian Women in Malaysia

Age x	n_x	1000 q_x	S_x	M_x	E_x	C_x	T_x	PRE(x)	e_x^o	Age at marriage
11	0.0037	1.56	100,000	370	98,924	99815	1063716	0.9892	10.6	21.6
12	0.0018	1.49	99,630	179	98,554	99540	963901	0.9892	9.7	21.7
13	0.0131	1.45	99,451	1,303	98,374	98799	864361	0.9892	8.7	21.7
14	0.0269	1.44	98,148	2,640	97,072	96828	765561	0.9890	7.8	21.8
15	0.0378	1.44	95,508	3,610	94,431	93703	668734	0.9887	7.0	22.0
16	0.0591	1.48	91,897	5,431	90,821	89182	575031	0.9883	6.4	22.4
17	0.1232	1.54	86,466	10,653	85,390	81140	485849	0.9876	5.9	22.9
18	0.1018	1.63	75,814	7,718	74,737	71955	404709	0.9858	5.6	23.6
19	0.1331	1.76	68,096	9,064	67,020	63564	332754	0.9842	5.2	24.2
20	0.1736	1.90	59,032	10,248	57,956	53908	269190	0.9818	4.6	24.6
21	0.1803	2.07	48,784	8,796	47,708	44386	215282	0.9779	4.8	25.8
22	0.1619	2.19	39,988	6,474	38,912	36751	170896	0.9731	4.6	26.6
23	0.1667	2.18	33,514	5,587	32,438	30721	134144	0.9679	4.4	27.4
24	0.2857	2.11	27,928	7,979	26,851	23938	103423	0.9615	4.3	28.3
25	0.2613	2.04	19,949	5,213	18,872	17342	79485	0.9461	5.6	30.6
26	0.2759	1.98	14,736	4,066	13,660	12703	62143	0.9270	4.9	30.9
27	0.2985	1.92	10,670	3,185	9,594	9078	49440	0.8991	5.5	32.5
28	0.2407	1.87	7,485	1,802	6,409	6584	40362	0.8562	6.2	34.2
29	0.2273	1.82	5,684	1,292	4,607	5038	33777	0.8106	6.9	35.9
30	0.1892	1.78	4,392	831	3,315	3976	28740	0.7549	7.5	37.5
31	0.2759	1.77	3,561	982	2,485	3070	24764	0.6978	8.5	39.5
32	0.1154	1.79	2,578	298	1,502	2430	21694	0.5826	9.6	41.6
33	0.3000	1.85	2,281	684	1,205	1939	19264	0.5281	10.5	43.5
34	0.1111	1.93	1,597	177	520	1508	17326	0.3259	11.7	45.7
35	0.1250	2.02	1,419	177	343	1330	15818	0.2417	11.2	46.2
36	0.0667	2.14	1,242	83	166	1200	14487	0.1333	12.4	48.4
37	0.0000	2.26	1,159	0	83	1159	13287	0.0714	11.8	48.8
38	0.0000	2.39	1,159	0	83	1159	12128	0.0714	10.8	48.8
39	0.0000	2.54	1,159	0	83	1159	10969	0.0714	9.8	48.8
40	0.0000	2.72	1,159	0	83	1159	9810	0.0714	9.0	49.0
41	0.0714	2.93	1,159	83	83	1118	8651	0.0714	8.1	49.1
42	0.0000	3.19	1,076	0	0	1076	7534	0.0000	7.4	49.4
43	0.0000	3.49	1,076	0	0	1076	6457	0.0000	6.4	49.4
44	0.0000	3.83	1,076	0	0	1076	5381	0.0000	5.5	49.5
45	0.0000	4.19	1,076	0	0	1076	4305	0.0000	4.5	49.5
46	0.0000	4.60	1,076	0	0	1076	3229	0.0000	3.5	49.5
47	0.0000	5.05	1,076	0	0	1076	2152	0.0000	2.5	49.5
48	0.0000	5.52	1,076	0	0	1076	1076	0.0000	1.5	49.5

APPENDIX 3

Example of the Computations

As discussed in Chapter 4, we developed a family life-cycle model for three major races in Malaysia namely Malays, Chinese and Indians. Twenty-seven family life-cycle models were created in this research.

- Single Malay man age 20, 30 and 40.
- Single Chinese man age 20, 30 and 40.
- Single Indian man age 20, 30 and 40.
- Married Malay man age 20, 30 and 40.
- Married Chinese man age 20, 30 and 40.
- Married Indian man age 20, 30 and 40.
- Single Malay woman age 20, 30 and 40.
- Single Chinese woman age 20, 30 and 40.
- Single Indian woman age 20, 30 and 40

For each of the family life-cycle models above, we estimated the amount of life insurance needs in terms of multiple of current income based on monthly current income of RM1,000, RM2,500 and RM5,000.

In order to show examples of the analysis and computations, two life-cycle models were chosen as follows:

- Example number 1: Married Malay man age 25 with current income of RM1,000 a month.
- Example number 2: Unmarried Chinese woman age 30 with current income of RM2,500 a month.

Example Number 1: Married Malay Man Age 25 with Current Income of RM1,000 a Month

This example shows the computation methods we have used in estimating the amount of life insurance needs for a single Malay man with current income of RM1,000.

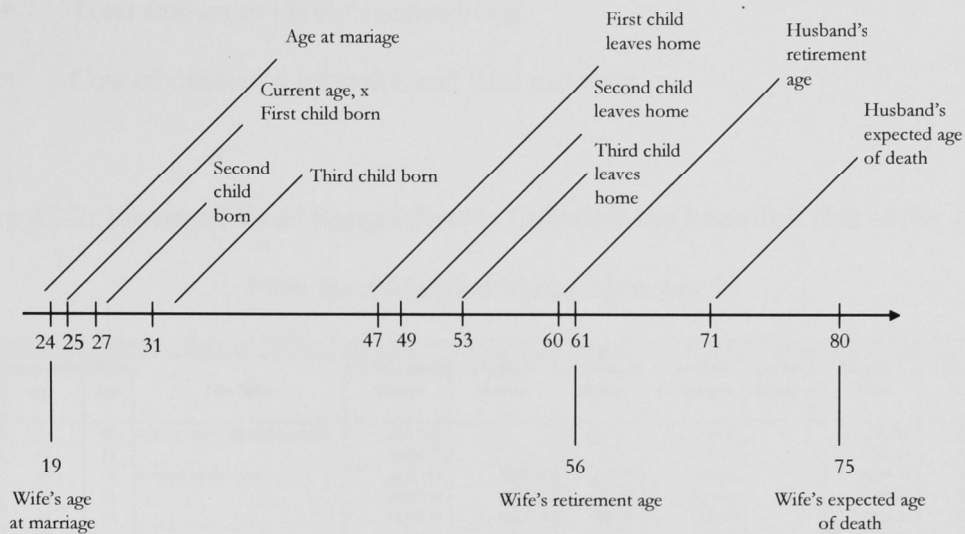
Firstly, we developed a life-cycle model for a married Malay man as we discussed in chapter 4 and details of this model can be found in sub-section 4.7.

We assume a married Malay man age 25 and his spouse were married when he was 24 and the wife was 19 years old. The married couple is expected to have three children – the first child is expected to be born after one year of marriage, while the second and third children are expected to be born after three and six years of marriage respectively.

We also make an assumption of the children making progress normally through their education until finishing tertiary education at the age of 22, leaving home and getting a job. Therefore, we assume that the first, second and third children would be finishing their tertiary education when the father's age is 47, 49 and 53 years respectively.

The person is expected to retire at the age of 60 and live until the age of 71, while his wife is expected to retire at the age of 56 and die at the age of 75. Figure A3-1 illustrates the example.

Figure A3-1: Family Life-Cycle for a Married Malay Man Age 25



Then, we use a spreadsheet program, Microsoft Excel to perform the analysis.

Example Number 1: Analysis of Income and Expenditure for a Married Malay Man

This sub-section discusses how the calculations were performed using the formulas and methodology described in chapter 5 (the analysis of income and taxes), chapter 6 (the analysis of expenditures) and chapter 7 (the analysis of expenditures after death of the breadwinner and post death needs). Figure A3-2 shows a spreadsheet set up to calculate the present value of net income flow for a married Malay man. Specifically, the tables show the projections of various components that made up the calculation of the net contribution in each year. This comprises of:

- Total household income, which is the combination of husband's and wife's income.

- Personal income tax for both husband and wife based on combined account assessment.
- Total amount of family's expenditure.
- Cost of children's education and final expenses.

Figure A3-2: Microsoft Excel Spreadsheet to Calculate the Present Value of Net Income Flow for a Married Malay Man Age 25

	A	B	C	H	L	T	U	V	W	X
1	Husband's	Wife's		(+) Husband's	(+) Wife's	(-) Analysis	(-) Analysis	(-) Other	Surplus /	Present
2	Age	Age	Life-Cycle	Income	Income	of Tax	of Expenses	Expenses	Deficit	Value
3										
4	23	20	Current age / First child born	11,467.76	-	-	6,433.07	-	5,032.69	5,032.69
5	26	21		12,131.75	-	-	6,628.12	-	5,503.63	5,503.33
6	27	22	Second child born	12,834.97	2,556.31	35.98	7,148.70	-	8,106.59	7,733.50
7	28	23		14,836.10	2,709.31	115.08	7,263.16	-	10,097.17	9,231.19
8	29	24		15,718.82	2,871.38	152.99	7,384.06	-	10,853.16	9,641.89
9	30	25		16,632.29	3,467.40	208.59	13,663.09	-	6,226.01	5,370.61
10	31	26	Third child born	18,461.36	3,668.20	235.91	15,320.68	-	6,552.97	5,488.01
11	32	27		19,534.03	3,881.10	303.91	15,780.30	-	7,330.91	5,960.70
12	33	28		20,667.76	4,492.57	368.71	16,253.71	-	8,337.92	6,739.91
13	34	29		22,363.25	4,733.73	447.49	16,741.33	-	10,130.19	7,763.94
14	35	30		23,291.73	4,442.66	522.63	18,770.66	-	10,441.07	7,769.14
15	36	31		26,751.85	4,931.46	686.30	19,233.78	-	11,663.23	8,423.77
16	37	32		28,292.89	5,218.26	840.28	19,913.80	-	12,757.08	8,947.36
17	38	33		29,918.79	5,521.34	1,003.50	20,511.21	-	13,923.43	9,482.34
18	39	34		31,633.36	6,028.31	1,191.51	21,126.55	-	15,343.62	10,143.94
19	40	35		34,142.40	5,972.09	1,293.10	26,818.59	-	11,900.80	7,638.67
20	41	36		36,084.90	6,316.48	1,663.26	27,623.15	-	13,114.97	8,171.82
21	42	37		38,127.95	6,679.81	2,030.10	28,451.84	-	14,303.82	8,653.26
22	43	38		40,274.38	7,063.04	2,460.13	29,203.40	-	15,371.07	9,146.95
23	44	39	First child enters university	42,327.55	7,466.90	2,382.79	30,184.36	53,475.06	-36,247.96	-10,671.71
24	45	40		44,890.34	7,967.13	3,053.99	25,378.22	-	24,123.26	13,411.94
25	46	41	Second child enters university	48,239.33	8,419.32	3,275.40	43,909.28	36,731.69	-47,237.32	-23,392.50
26	47	42	First child leaves home	51,002.24	8,894.66	4,718.91	41,815.31	-	13,362.49	6,973.78
27	48	43		53,763.95	9,293.74	5,335.36	43,069.97	-	14,552.36	7,373.36
28	49	44	Second child leaves home	56,646.11	9,917.14	7,012.20	42,930.42	-	16,620.64	8,176.23
29	50	45	Third child enters university	59,648.59	10,363.72	7,498.54	39,102.31	63,852.02	-40,438.55	-19,313.68
30	51	46		62,771.66	11,163.43	8,790.48	40,273.38	-	24,969.23	11,331.74
31	52	47		67,298.35	11,769.48	10,483.57	41,483.64	-	27,200.83	12,243.51
32	53	48	Third child leaves home	70,823.80	12,402.31	12,656.97	31,128.33	-	39,440.78	17,238.63
33	54	49		74,263.01	13,061.78	14,146.70	32,062.20	-	41,213.88	17,489.31
34	55	50		78,010.34	13,236.26	15,009.01	30,040.58	-	44,197.21	18,208.66

The calculational method and the details of the calculations are explained below. Several values are chosen as examples.

Husband's Income Projection

To estimate the total income for the husband for each year until retirement, we use the formula that has been developed in sub-section 5.2.

Let,

x = Current age

S_x = Current monthly salary

EPF = The statutory minimum Employee Provident Fund (EPF) contribution rate
(employee)

$SOCSO$ = Social Security Organisation's contribution rate

s = Constant future salary increment rate per annum

p = Total promotional increment rate

${}_tP_x$ = Probability that a person age x will survive for t more years

$I_{h(x+t)}$ = Total income for the husband at age $x+t$

The formula to estimate the total income for the husband at age $x+t$ is as follows,

$$I_{h(x+t)} = 13.68 S_x (1+s)^t (p) {}_tP_x [1 - EPF - SOCSO]$$

Where,

$$SOCSO = 0, \text{ when } S > \text{RM}2,000$$

$$s = 0.06, \text{ when } x+t > 1$$

And,

We define $1 \leq n \leq 9$

$$p = (1+p_1)(1+p_2)(1+p_3)\dots\dots\dots(1+p_9), \text{ where } x+t \geq a_n$$

$$\text{And where, } p_1 = 0.099, \text{ when } a_1 = 25$$

$$p_2 = 0.094, \text{ when } a_2 = 28$$

$$p_3 = 0.049, \text{ when } a_3 = 31$$

$$p_4 = 0.032, \text{ when } a_4 = 34$$

$$p_5 = 0.021, \text{ when } a_5 = 40$$

$$p_6 = 0.021, \text{ when } a_6 = 46$$

$$p_7 = 0.021, \text{ when } a_7 = 52$$

$$p_8 = 0.021, \text{ when } a_8 = 56$$

$$p_9 = 0.021, \text{ when } a_9 = 58$$

Column H4 (figure A3-2): Husband's total income at age 25 with current income of RM1,000 a month

The estimation of total income for the husband at age 25 is

$$\begin{aligned} I_{h(25)} &= 13.68 S_{25} (1+s)^1 (p) {}_1P_{25} [1 - EPF - SOCSO] \\ &= 13.68 * 1,000 (1+0)^1 (1)(0.9979599752)[1 - 0.11 - 0.05] \\ &= \underline{\text{RM11,467.76}} \end{aligned}$$

Column H7 (figure A3-2): Husband's total income at age 28 with current income of RM1,000 a month

The estimation of total income for the husband at age 28 is

$$\begin{aligned} I_{h(28)} &= 13.68 S_{25} (1+s)^3 (1+p_2) {}_3P_{25} [1 - EPF - SOCSO] \\ &= 13.68 * 1,000 (1+0.06)^3 (1+0.094)(0.9922124006)[1 - 0.11 - 0.05] \\ &= \underline{\text{RM14,856.10}} \end{aligned}$$

Column H10 (figure A3-2): Husband's total income at age 31 with current income of RM1,000 a month

The estimation of total income for the husband at age 31 is

$$I_{h(31)} = 13.68 S_{25} (1+s)^6 [(1+p_2)(1+p_3)] {}_6P_{25} [1 - EPF - SOCSO]$$

$$= 13.68 * 1,000 (1 + 0.06)^3 [(1 + 0.094)(1 + 0.049)](0.9868937647)[1 - 0.11 - 0.05]$$

$$= \underline{\text{RM18,461.36}}$$

Retirement Income for the Husband

Employee Provident Fund (EPF) savings along with the accumulated dividend can be withdrawn upon retirement.

To make the projection of EPF savings on retirement, we use the formula that has been discussed in sub-section 5.1.6. We assume there is no partial withdrawal of savings during the person's working lifetime.

Let,

- X = Salary per month at entry into EPF membership
- k = Total statutory minimum EPF contribution rate
- s = Constant future salary increment rate per annum
- d = Constant future EPF dividend rate
- n = Number of completed years in service

Therefore, the projected EPF savings at the end of n years,

$$= 12Xk (1 + d)^{n-1} * \left[\frac{1 - \left(\frac{1+s}{1+d} \right)^n}{1 - \left(\frac{1+s}{1+d} \right)} \right], \text{ if } s < d$$

$$= 12Xk (1+d)^{n-1} * \left[\frac{\left(\frac{1+s}{1+d}\right)^n - 1}{\left(\frac{1+s}{1+d}\right) - 1} \right], \text{ if } s > d$$

$$= 12Xk (1+d)^{n-1} \quad , \text{ if } s = d$$

We assume the constant future salary increment rate, s is 6% per annum, while the constant future EPF dividend rate, d is 5% per annum. Since the rate of s is greater than d , so we use the first formula to make a projection of EPF savings on retirement age.

Column H39 (figure A3-3): EPF savings on retirement for the husband

In this life-cycle family model, we assume a person will start working after finishing tertiary education, which is at age 22. Since our first example is a man age 25 with current salary of RM1,000 per month, we need to calculate the salary per month at entry into EPF membership when he starts working three years before.

Salary per month at entry into EPF membership for the husband, X_h

$$= \frac{1,000}{(1+0.06)^3 (1+0.099)_1 P_{22}} = \text{RM}765.55$$

The projected EPF savings for the husband on retirement age, which is at age 60 is

$$\text{EPF Savings} = 12(765.55)(1+0.05)^{37} * \left[\frac{1 - \left(\frac{1+0.06}{1+0.05}\right)^{38}}{1 - \left(\frac{1+0.06}{1+0.05}\right)} \right]$$

$$= \underline{\text{RM } 1,371,995.54}$$

Figure A3-3: Microsoft Excel Spreadsheet Shows the Amount of EPF Savings
for a Married Malay man age 25 and His Wife upon Retirement

	A	B	C	H	L
23	44	39	First child enters university	42,527.55	7,466.90
24	45	40		44,890.34	7,967.13
25	46	41	Second child enters university	48,359.53	8,419.32
26	47	42	First child leaves home	51,002.24	8,894.66
27	48	43		53,763.95	9,293.74
28	49	44	Second child leaves home	56,646.11	9,917.14
29	50	45	Third child enters university	59,648.59	10,263.72
30	51	46		62,771.66	11,163.45
31	52	47		67,398.55	11,769.48
32	53	48	Third child leaves home	70,823.80	12,402.31
33	54	49		74,363.01	13,061.78
34	55	50		78,010.54	11,236.26
35	56	51		83,480.37	11,818.98
36	57	52		87,418.53	12,683.64
37	58	53		93,384.35	13,220.60
38	59	54		97,620.35	13,977.67
39	60	55	Husband's retirement age	1,271,995.54	10,619.17
40	61	56	Wife's retirement age		259,860.52
41	62	57			

Present Value of Income for the Husband, $PV(I_h)$

The income for the husband is estimated for each year until retirement age using the formula below,

$$PV(I_{h(25)}) = I_{h(25)}V^0 + I_{h(26)}V^1 + I_{h(27)}V^2 + \dots + I_{h(59)}V^{34} + (EPF \text{ Savings})_{60}V^{35}$$

$$\text{Where, } V = \frac{1}{1+i} = \frac{1}{1+0.03}$$

Wife's Income Projection

As we discussed in sub-section 5.1.2, for a married couple, we take the wife's income accumulation into account in determining the total present value of net income flow to the family. We include the wife's labour force participation rate, wife's income in percentage of the husband's and the mortality rate in projecting the income.

To estimate the total income for the wife for each year until retirement, we use the formula that has been developed in sub-section 5.2.

Let,

x = Husband's current age

y = Wife's current age

S_x = Husband's current monthly salary

EPF = The statutory minimum Employee Provident Fund (EPF) contribution rate (employee)

$SOCSO$ = Social Security Organisation's contribution rate

s = Constant future salary increment rate per annum

p = Total promotional increment rate

${}_tP_x$ = Probability that a husband age x will survive for t more years

${}_tP_y$ = Probability that a wife age y will survive for t more years

f_{y+t} = Women's labour force participation rate at age $y+t$

$I_{w(y+t), h(x+t)}$ = Total income for the wife at age $y+t$ (while the husband's age is $x+t$)

The formula to estimate the total income for the wife at age $y+t$ is as follows,

$$I_{w(y+t), h(x+t)} = 6.45696 S_x (1+s)^t (p) {}_tP_x (f_{y+t}) {}_tP_y [1 - EPF - SOCSO]$$

Where,

$$SOCSO = 0, \text{ when } S > \text{RM}2,000$$

$$s = 0.06, \text{ when } x+t > 1$$

And,

$$\text{We define } 1 \leq n \leq 9$$

$$p = (1 + p_1)(1 + p_2)(1 + p_3)\dots\dots\dots(1 + p_9), \text{ where } x + t \geq a_n$$

And where, $p_1 = 0.099$, when $a_1 = 25$

$$p_2 = 0.094, \text{ when } a_2 = 28$$

$$p_3 = 0.049, \text{ when } a_3 = 31$$

$$p_4 = 0.032, \text{ when } a_4 = 34$$

$$p_5 = 0.021, \text{ when } a_5 = 40$$

$$p_6 = 0.021, \text{ when } a_6 = 46$$

$$p_7 = 0.021, \text{ when } a_7 = 52$$

$$p_8 = 0.021, \text{ when } a_8 = 56$$

$$p_9 = 0.021, \text{ when } a_9 = 58$$

Column L9 (figure A3-2): Wife's total income at age 25

The estimation of total income for the wife at age 25 (when the husband's current age is 30) is

$$\begin{aligned} I_{w(25),h(30)} &= 6.45696 S_{25} (1 + s)^1 (p) {}_1P_{25}(f_{25}) {}_1P_{25} [1 - EPF - SOCSO] \\ &= 6.45696 * 1,000 (1 + 0)^1 (0.9979599752)(1)(0.642)(0.9978100403)[1 - 0.11 - 0.05] \\ &= \underline{\underline{RM3,467.40}} \end{aligned}$$

Column L12 (figure A3-2): Wife's total income at age 28

The estimation of total income for the wife at age 28 (while the husband's current age is 33)

$$\begin{aligned} \text{is, } I_{w(28),h(33)} &= 6.45696 S_{25} (1 + s)^3 (1 + p_2) {}_3P_{25}(f_{28}) {}_1P_{28} [1 - EPF - SOCSO] \\ &= 6.45696 * 1,000 (1 + 0.06)^3 (1 + 0.094)(0.9922124006)(1)(0.642)(0.9979599753) \\ &\quad [1 - 0.11 - 0.05] \\ &= \underline{\underline{RM4,492.57}} \end{aligned}$$

Retirement Income for the Wife

Using the formula above, the Employee Provident Fund (EPF) savings is then projected.

Column L40 (figure A3-3): EPF savings on retirement for the wife

Women's salary is 47.2% lower of the income earned by men of the same age. Therefore, the salary per month at entry into EPF membership for the wife, X_w

$$= \text{RM}765.55 (0.472) (f_{22})_i P_{22}$$

$$= \text{RM}222.91$$

The projected EPF savings for the wife on retirement age, which is at age 56 is

$$\begin{aligned} \text{EPF Savings} &= 12(222.91)(1 + 0.05)^{33} * \left[\frac{1 - \left(\frac{1 + 0.06}{1 + 0.05} \right)^{34}}{1 - \left(\frac{1 + 0.06}{1 + 0.05} \right)} \right] \\ &= \underline{\text{RM } 259,860.52} \end{aligned}$$

Present Value of Income for the Wife, $PV(I_w)$

The income for the wife is estimated for each year until retirement age.

Therefore, the present value of income for wife is as follows,

$$\begin{aligned} PV(I_w) &= I_{w(20),h(25)} V^0 + I_{w(21),h(26)} V^1 + I_{w(22),h(27)} V^2 + \dots + I_{w(55),h(60)} V^{35} \\ &\quad + (EPF \text{ Savings})_{w(56),h(61)} V^{36} \end{aligned}$$

$$\text{Where, } V = \frac{1}{1+i} = \frac{1}{1+0.03}$$

Combined Income Tax of the Husband and Wife

As discussed in sub-section 5.3, the analysis of income tax for a married couple is based on the combined account assessment.

In order to make the estimation of the total income tax for the husband and wife, we use the formula that has been developed in sub-section 5.3.2 as follows.

Let,

x = Current age

GI_{x+t} = Total gross income at age $x+t$

T_{x+t} = Total income tax payable at age $x+t$

ded = Personal deductions

reb = Rebates

The formula to calculate the tax is,

Taxable income at age $x+t = GI_{x+t} - ded$

Tax charged at age $x+t =$ Tax on the first taxable income + Tax on the next
taxable income

Therefore, income tax payable at age $x+t$ is

$T_{x+t} =$ Tax charges at age $x+t - reb$

Column T12 (figure A3-2): Total income tax payable for a married couple age 33 for the husband with current income of RM1,000 a month, and at the wife's age of 28

Firstly, we need to calculate chargeable income for both husband and wife. Generally, chargeable income refers to an individual's gross income.

The estimation of husband's gross income at age 33 is

$$\begin{aligned}
 GI_{h(33)} &= 13.68 S_{25} (1+s)^8 [(1+p_2)(1+p_3)] \\
 &= 13.68 * 1,000 (1+0.06)^8 [(1+0.094)(1+0.049)] \\
 &= \text{RM}25,022.22
 \end{aligned}$$

The estimation of wife's gross income at age 28 is

$$\begin{aligned}
 GI_{w(28)} &= 6.45696 S_{25} (1+s)^3 (1+p_2)(f_{25}) \\
 &= 6.45696 * 1,000 (1+0.06)^3 (1+0.094)(0.642) \\
 &= \text{RM}5,401.30
 \end{aligned}$$

$$\begin{aligned}
 \text{Therefore, the total chargeable income} &= GI_{h(33)} + GI_{w(28)} \\
 &= \text{RM}25,022.22 + \text{RM}5,402.30 \\
 &= \text{RM}30,423.52
 \end{aligned}$$

Then, we perform the income tax computation.

	<u>RM</u>
Total chargeable income	30,423.52
<i>Less personal deductions</i>	
Self	(8,000.00)
Spouse	(3,000.00)
Children (3 children x RM800 each)	(2,400.00)
Therefore, taxable income is	17,023.52
Tax on the first taxable income (RM2,500 x 0%)	
Tax on the second taxable income (RM2,500 x 1%)	25.00
Tax on the third taxable income (RM12,023.52 x 3%)	360.71
Therefore, income tax payable is	385.71
<i>Less rebates</i>	
Zakat (5 persons x RM3.40 each)	(17.00)
	<u>RM368.71</u>

Hence, the total income tax payable for the married couple where the husband's age is 33 with current income of RM1,000 a month is RM368.71.

Present Value of Income Tax of the Husband and Wife, $PV(T)$

The combined income tax for both husband and wife is estimated for each year until retirement age.

Therefore, the present value of income for the wife is as follows,

$$PV(T) = T_{h(25)}V^0 + T_{h(26)}V^1 + T_{h(27)}V^2 + \dots + T_{h(59)}V^{36}$$

$$\text{Where, } V = \frac{1}{1+i} = \frac{1}{1+0.03}$$

Household Expenditure

The household expenditure is calculated using the methodology developed in chapter 6.

Let,

x = Current age

HE_{x+t} = Average monthly household expenditure costs at age $x+t$

HEI = Household expenditure Index

E_{x+t} = Total household expenditure at age $x+t$

i = Interest rate

The formula to calculate the household expenditure is as follows,

$$E_{x+t} = 12 HE_{x+t} HEI (1+i)^t$$

Column U12 (figure A3-2): Total household expenditure at age 33 with current income of RM1,000 a month

At age 33, the person in this example has four dependents – wife and three children. Thus, we use the average monthly expenditure costs of a married couple with three children as shown in table 6.3. Therefore, the average monthly expenditure cost at age 33, E_{33} is RM1,782.06.

We need to make an adjustment for the average monthly expenditure costs using the household expenditure index, HEI . The total income for both husband and wife in that particular year is between RM1,500 to RM2,500. Therefore, the HEI of 0.6 is used as an adjustment.

The estimation of total household expenditure at age 33 is

$$E_{33} = 12 HE_{33} HEI (1 + i)^8 = 12 (1,782.06)(0.6)(1 + 0.03)^8 = \underline{RM16,253.71}$$

After the death of the breadwinner, we assume the widow and her children will live within their current standard of living. To estimate the household expenditure after the death of the breadwinner, we use the last household index, *HEI* before the husband's dies. The only difference is the use of another set of data for the average monthly expenditure cost.

If the widow has children below 22 years old, we use the data set in table 7.2 – average monthly expenditure costs of a widow with children by number of children. However, if the widow doesn't have any children below 22 years, we use the average monthly personal expenditure for single woman as in table 6.2.

Figure A3-3: Microsoft Excel Spreadsheet Shows the Household Expenditure Costs after Death of the Breadwinner

	A	B	C	H	L	T	U
35	56	51		83,480.37	11,818.08	17,208.28	30,041.70
36	57	52		87,418.53	12,683.64	19,459.32	31,870.05
37	58	53		93,384.35	13,220.60	22,197.08	32,826.15
38	59	54		97,620.33	13,977.67	24,459.01	48,349.64
39	60	55	Husband's retirement age	1,271,993.54	10,619.17	4.83	48,718.04
40	61	56	Wife's retirement age		259,860.52	-	50,179.38
41	62	57				-	51,684.97
42	63	58				-	53,233.32
43	64	59				-	54,832.58
44	65	60				-	56,563.87
45	66	61				-	58,082.85
46	67	62				-	59,643.34
47	68	63				-	55,254.70
48	69	64				-	56,912.34
49	70	65				-	58,619.71
50	71	66	Husband dies			-	50,640.31
51		67				-	51,559.32
52		68				-	52,506.31
53		69				-	53,481.90
54		70				-	54,485.94
55		71				-	55,520.32
56		72				-	56,586.13
57		73				-	57,683.72
58		74				-	58,814.23
59		75	Wife dies			-	59,978.66

Household expenditures after death of the breadwinner

Present Value of Household Expenditure, $PV(E)$

The household expenses are estimated for each year until the expected death of the wife.

$$PV(E) = E_{h(25),w(21)}V^0 + E_{h(26),w(22)}V^1 + E_{h(27),w(23)}V^2 + \dots + E_{h(80),w(75)}V^{55}$$

$$\text{Where, } V = \frac{1}{1+i} = \frac{1}{1+0.03}$$

Other Expenses

There are two types of expenses that are included in the analysis – children's education cost and funeral expenses.

Column 23V (figure A3-4): The education cost for the first child

In this example, the model is for a Malay family. We assume that the cost of education in Malaysia for a Bumiputera (Malay and other indigenous group) student is lower than for a non-Bumiputera (Chinese and Indian) student, which is only RM30,496.08 for a 3-years degree program in the university.

$$\begin{aligned} \text{Therefore, the education cost for the first child} &= 30,496.08(1+i)^t \\ &= 30,496.08(1+0.03)^{19} \\ &= \underline{\underline{\text{RM53,475.06}}} \end{aligned}$$

Column 25V (figure A3-4): The education cost for the second child

$$\begin{aligned} \text{The education cost for the second child} &= 30,496.08(1+i)^t \\ &= 30,496.08(1+0.03)^{21} = \underline{\underline{\text{RM56,731.69}}} \end{aligned}$$

Column 25V (figure A3-4): The education cost for the third child

$$\begin{aligned}\text{The education cost for the third child} &= 30,496.08(1+i)^t \\ &= 30,496.08(1+0.03)^{25} \\ &= \underline{\underline{\text{RM63,852.02}}}\end{aligned}$$

Column 50V (figure A3-4): Funeral expenses for the husband

The husband is expected to die at the age of 71. As discussed in sub-section 7.3.1, we assume the funeral expenses are RM5,000 in our model.

$$\begin{aligned}\text{The funeral expenses for the husband} &= 5,000(1+i)^t \\ &= 5,000(1+0.03)^{46} \\ &= \underline{\underline{\text{RM19,475.22}}}\end{aligned}$$

Column 59V (figure A3-4): Funeral expenses for the wife

The wife is expected to die nine years after the husband dies.

$$\begin{aligned}\text{The funeral expenses for the husband} &= 5,000(1+i)^t \\ &= 5,000(1+0.03)^{55} \\ &= \underline{\underline{\text{RM25,410.74}}}\end{aligned}$$

Figure A3-4: Microsoft Excel Spreadsheet Shows the Children's Education Cost and Funeral Expenses for a Married Malay man age 25 and His Family

	A	B	C	H	L	T	U	V	W	X
23	44	39	First child enters university	42,527.55	7,466.90	2,582.79	30,184.56	53,475.06	- 36,247.96	- 20,671.71
24	45	40		44,800.34	7,967.13	3,053.99	25,578.22	-	- 24,225.26	- 13,412.94
25	46	41	Second child enters university	48,359.53	8,419.32	3,275.40	43,909.28	56,731.69	- 47,237.52	- 23,392.50
26	47	42	First child leaves home	51,002.24	8,894.66	4,718.91	41,815.51	-	- 13,362.49	- 6,973.78
27	48	43		53,763.95	9,393.74	5,535.36	40,669.97	-	- 14,552.36	- 7,373.56
28	49	44	Second child leaves home	56,646.11	9,917.14	7,012.20	42,930.42	-	- 16,620.64	- 8,176.25
29	50	45	Third child enters university	59,648.59	10,365.72	7,498.54	39,102.31	63,852.02	- 40,438.55	- 19,313.68
30	51	46		62,771.66	11,163.45	8,790.48	40,275.38	-	- 24,969.25	- 11,531.74
31	52	47		67,298.55	11,769.48	10,483.57	41,483.64	-	- 27,200.83	- 12,245.51
32	53	48	Third child leaves home	70,823.80	12,402.31	12,656.97	31,128.35	-	- 39,440.78	- 17,238.65
33	54	49		74,363.01	13,061.78	14,146.70	32,062.20	-	- 41,215.88	- 17,489.81
34	55	50		78,010.34	13,736.26	15,009.01	30,040.58	-	- 44,197.21	- 18,208.66
35	56	51		83,480.37	14,518.98	17,298.28	30,941.79	-	- 46,959.28	- 18,783.11
36	57	52		87,418.53	15,383.64	19,459.32	31,870.05	-	- 48,772.80	- 18,940.28
37	58	53		93,384.35	16,320.60	22,197.08	32,826.15	-	- 51,681.72	- 19,485.36
38	59	54		97,620.35	17,377.67	24,459.01	48,240.64	-	- 58,789.37	- 14,198.65
39	60	55	Husband's retirement age	1,276,207.14	10,619.17	4.83	48,718.04	-	- 1,338,103.45	- 475,539.75
40	61	56	Wife's retirement age		285,307.54	-	50,179.58	-	- 235,327.76	- 81,195.71
41	62	57				-	51,684.97	-	- 51,684.97	- 17,313.58
42	63	58				-	53,235.52	-	- 53,235.52	- 17,313.58
43	64	59				-	54,832.58	-	- 54,832.58	- 17,313.58
44	65	60				-	56,475.87	-	- 56,475.87	- 15,501.31
45	66	61				-	58,162.85	-	- 58,162.85	- 15,501.31
46	67	62				-	59,895.34	-	- 59,895.34	- 15,501.31
47	68	63				-	61,673.70	-	- 61,673.70	- 15,501.31
48	69	64				-	63,497.24	-	- 63,497.24	- 15,501.31
49	70	65				-	65,366.19	-	- 65,366.19	- 15,501.31
50	71	66	Husband dies			-	30,640.31	19,475.22	- 50,115.53	- 12,866.49
51		67				-	31,559.52	-	- 31,559.52	- 7,866.49
52		68				-	32,506.31	-	- 32,506.31	- 7,866.49
53		69				-	33,481.50	-	- 33,481.50	- 7,866.49
54		70				-	34,485.94	-	- 34,485.94	- 7,866.49
55		71				-	35,520.52	-	- 35,520.52	- 7,866.49
56		72				-	36,586.13	-	- 36,586.13	- 7,866.49
57		73				-	37,683.72	-	- 37,683.72	- 7,866.49
58		74				-	38,814.23	-	- 38,814.23	- 7,866.49
59		75	Wife dies				39,978.66	23,410.74	- 63,389.40	- 12,866.49

Other expenses

Present Value of Other Expenses, $PV(OE)$

The present value of other expenses that consist of education costs for children and funeral expenses for husband and wife in this example are as follows,

$$\begin{aligned}
 PV(OE) = & (\text{Education cost for the first child})_{h(44),w(39)} V^{20} \\
 & + (\text{Education cost for the second child})_{h(46),w(41)} V^{21} \\
 & + (\text{Education cost for the third child})_{h(50),w(45)} V^{25} \\
 & + (\text{Funeral expenses for the husband})_{h(71),w(66)} V^{46} \\
 & + (\text{Funeral expenses for the wife})_{h(80),w(75)} V^{55}
 \end{aligned}$$

$$\text{Where, } V = \frac{1}{1+i} = \frac{1}{1+0.03}$$

Example Number 1: Present Value of Net Future Income

Finally, the present value of net income flow for a married Malay man age 25 can be calculated using the equation below.

$$\text{Present Value of Net Future Income} = PV(I_h) + PV(I_w) - PV(T) - PV(E) - PV(OE)$$

Where, $PV(I_h)$ = Present value of income for the husband

$PV(I_w)$ = Present value of income for the wife

$PV(T)$ = Present value of income tax of the husband and wife

$PV(E)$ = Present value of household expenditure

$PV(OE)$ = Present value of other expenses

Alternatively, the present value of the net future income can be calculated by making projections of total income for the husband and wife, income tax, household expenditure and other expenses for each year to get the surplus or deficit for that particular year.

Then, the total surplus or deficit in each year when summed up gives an estimate of the monetary value of the individual's life. This is how we calculated in the Microsoft Excel spreadsheet in this research.

Let,

x = Current age

$I_{h(x+t)}$ = Husband's income at age $x+t$

$I_{w(y+t)}$ = Wife's income at age $y+t$

T_x = Total income tax payable at age $x+t$

E_{x+t} = Total household expenditure in year $x+t$

OE_{x+t} = Total of other expenses in year $x+t$

$(e_y^o)_w$ = Wife's life expectancy

gap = Age gap between husband and wife

To calculate the surplus or deficit at age $x+t$ as in column W in figure A3-4, we use the formula below,

$$\text{Surplus or deficit at age } x+t = I_{h(x+t)} + I_{w(y+t),h(x+t)} - T_{x+t} - E_{x+t} - OE_{x+t}$$

$$\text{Where, } t = 0,1,2,3,\dots,x+t \leq \left[(e_y^o)_w + gap \right]$$

Finally, the present value for each year is then calculated and summed up from the person's current age until the surviving wife expected age of death.

Therefore, the present value of a human life, $(HLV)_x$ is,

$$= (\text{Surplus or deficit})_{x+0} V^0 + (\text{Surplus or deficit})_{x+1} V^1 + \dots + (\text{Surplus or deficit})_{x+(e_x^o)_w} V^{(e_x^o)}$$

$$= \sum_x^{(e_x^o)_w + gap} (\text{Surplus or deficit})_{x+t} V^t$$

$$\text{Where, } t = 0,1,2,3,\dots,x+t \leq \left[(e_y^o)_w + gap \right]$$

In this example, the monetary value of a human life for a married Malay man age 25, $(HLV)_{25}$ is,

$$= \sum_{y=25}^{80} (\text{Surplus or deficit})_{y+t} V^t$$

Where, $t = 0,1,2,3,\dots,x+t \leq 80$

Example Number 1: Analysis of Income and Expenses if the Breadwinner Dies Today

So far we have discussed how the calculations were performed using the formulas and methodology to estimate the present value of net future income to the family if the breadwinner survives until his life expectancy.

As a head of the family, the death of the breadwinner usually terminates an income stream that the family relied upon. Therefore, now we are estimating the amount of life insurance needs to maintain the family's current standard of living if the husband dies today and improvement of life that will be enjoyed by the family in the future should the husband still survive.

Figure A3-5 shows a spreadsheet set up to perform the calculations. The tables show the similar columns that had been used in estimating the present value of net future income flow as discussed above.

Figure A3-5: Microsoft Excel Spreadsheet to Calculate the Amount of Life

Insurance required for a Married Malay man age 25

	A	B	C	G	J	D	P	Q	R	S
	Husband's Age	Wife's Age	Life-Cycle	(+) Husband's Income	(+) Wife's Income	(-) Analysis of Tax	(-) Analysis of Expenses	(-) Other Expenses	Surplus/ Deficit	Present Value
4	25	20	Current age / First child born	-	-	-	4,484.98	-	-	-
5	26	21		-	-	-	4,619.53	-	-	-
6	27	22	Second child born	-	2,556.31	-	5,055.71	-	2,499.40	2,355.92
7	28	23		-	2,709.31	-	5,207.38	-	2,498.07	2,286.09
8	29	24		-	2,871.38	-	5,363.60	-	2,492.22	2,214.30
9	30	25		-	3,047.40	-	6,010.73	-	2,543.53	2,193.90
10	31	26	Third child born	-	3,668.20	-	9,831.90	-	6,163.70	5,162.00
11	32	27		-	3,881.10	-	10,126.86	-	6,245.76	5,078.37
12	33	28		-	4,492.57	-	10,430.67	-	5,938.10	4,687.59
13	34	29		-	4,753.75	-	10,743.59	-	5,989.84	4,590.71
14	35	30		-	4,442.66	-	13,629.96	-	11,187.30	8,324.40
15	36	31		-	4,931.46	-	16,098.86	-	11,167.40	8,067.57
16	37	32		-	5,218.26	-	16,581.83	-	11,363.57	7,970.18
17	38	33		-	5,521.34	-	17,079.28	-	11,557.94	7,870.40
18	39	34		-	6,028.31	-	17,591.66	-	11,563.35	7,644.74
19	40	35		-	5,972.09	-	19,130.43	-	13,158.34	8,445.84
20	41	36		-	6,316.48	-	19,704.34	-	13,387.86	8,342.87
21	42	37		-	6,679.81	-	20,295.47	-	13,618.66	8,237.70
22	43	38		-	7,063.04	-	20,904.34	-	13,841.30	8,130.30
23	44	39	First child enters university	-	7,466.90	-	21,531.47	53,475.06	67,539.63	38,516.91
24	45	40		-	7,967.13	-	23,438.93	-	15,471.80	8,566.36
25	46	41	Second child enters university	-	8,419.32	-	40,236.83	56,731.69	88,549.20	47,599.56
26	47	42	First child leaves home	-	8,894.66	-	40,504.20	-	51,609.54	16,496.78

We used the same method and formula discussed above in calculating the husband's income to calculate the wife's income. After the death of the breadwinner, the income tax calculation is now based only on wife's total income.

When determining the household expenditure costs for the purpose of estimating the amount of life insurance needs against loss by death or disability, we should consider the surviving family enjoying the same standard of living and improvement of life in the future that it would have enjoyed if the breadwinner still survives. Therefore, we use the same household expenditure index, *HEI* for each year similar as we projected the household expenditure for the family if the breadwinner survives.

For the average monthly expenditure cost for the widow and her children, we use the data set in table 7.2. However, if the widow doesn't have any children below 22 years, we use the

average monthly personal expenditure for single woman as in table 6.2. To estimate the education costs for children and funeral expenses for the wife, we use the same method and formula discussed above in calculating the husband's estimated education costs for children and funeral expenses.

Example Number 1: Life Insurance Needs in a Multiple of Income

With the same methodology used in calculating the present value of net future income flow to the family for a married Malay man age 25, we are now estimating the life insurance needs should the breadwinner die today.

Firstly, the surplus or deficit for each year after death of the breadwinner (Surplus or deficit) $'_{x+t}$ is estimated. Then, the present value for each year is calculated and summed up from current age until the surviving wife's expected age of death to estimate the monetary value of a human life after death of the breadwinner, $(HLV)'_{x+t}$.

$$\begin{aligned} \text{Therefore, } (HLV)'_{25} &= \sum_{25}^{80} (\text{Surplus or deficit})'_{y+t} V^t, \text{ where, } t = 0,1,2,3,\dots,y+t \leq 80 \\ &= \text{RM } -481,624.94 \end{aligned}$$

Finally, we can estimate the life insurance required for a married Malay man at age 25 in times of current income by the following formula.

$$\begin{aligned}
(\text{Life Insurance required in times of current income})_{25} &= \frac{-(HLV)_{25} - (\text{EPF saving at death})}{12 * 1,000} \\
&= \frac{-(-481,624.94) - 7,340.97}{12 * 1,000} \\
&= \underline{39}
\end{aligned}$$

$$\begin{aligned}
\text{Where, (EPF Savings at death)} &= 12(765.55)(1 + 0.05)^2 * \left[\frac{1 - \left(\frac{1 + 0.06}{1 + 0.05}\right)^3}{1 - \left(\frac{1 + 0.06}{1 + 0.05}\right)} \right] \\
&= \text{RM } 7,340.97
\end{aligned}$$

Therefore, life insurance required for a married Malay man age 25 with current salary of RM1,000 is 39 times his annual income. The life insurance amount of RM468,000 is required to maintain his surviving spouse and children to live in the same current standard of living if he dies today.

Example Number 2: Unmarried Chinese Woman Age 30 with Current Income of RM2,500 a Month

For a married couple, the head of the household is the husband. When a woman gets married, she becomes the responsibility of her husband. A husband is responsible towards his family's expenditure and their children's education cost.

Therefore, in calculating the present value of net future income flow for married women as well as the amount of life insurance needs to be purchased, we excluded the analysis of

husband's income, household expenditure, children's education cost and funeral expenses for the husband.

Firstly, we developed a life-cycle model for a Chinese married woman age 35. From the nuptiality table that has been constructed in sub-section 4.1.2, a Chinese woman age 30 is expected to get married at the age of 40. The median age gap at first marriage is 3 years for woman who marries at the age of 30.

From table 4.4, the 'Distribution of Number of Children Born According to Age of Mother by Race' in sub-section 4.3.2, a couple is expected to remain childless when the woman marries at the age of 40.

The person is expected to retire at the age of 56 and live until 75 years old.

Figure A3-6 illustrates the family life-cycle model of this example.

Figure A3-6: Family Life-Cycle for an Unmarried Chinese Woman Age 30

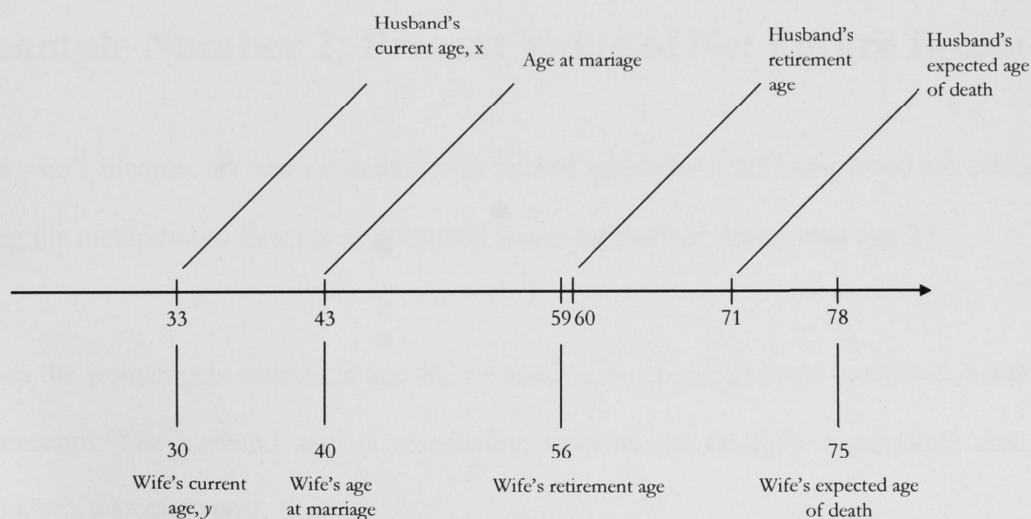


Figure A3-7 shows a spreadsheet set up to calculate the monetary value of a human life and hence the life insurance required in times of annual income for the example discussed in this sub-section – unmarried Chinese woman age 30 with current income of RM2,500.

Figure A3-7: Microsoft Excel Spreadsheet to Calculate the Amount of Life Insurance Required for a for an Unmarried Chinese Woman Age 30

	A	B	C	J	O	P	Q	R	S
1	Husband's	Wife's		(+)Wife's	(-) Analysis	(-) Analysis	(-) Other	Surplus/	Present
2	Age	Age	Life-Cycle	Income	of Tax	of Expenses	Expenses	Deficit	Value
3									
4		30	Current age	7,673.51	-	3,163.36	-	2,510.15	2,510.15
5		31		8,510.35	-	3,318.26	-	3,192.09	3,099.11
6		32		9,021.40	-	3,477.81	-	3,543.60	3,340.18
7		33		9,563.06	-	3,642.14	-	3,920.92	3,588.20
8		34		10,442.98	-	8,717.11	-	1,725.87	1,533.41
9		35		10,366.55	-	9,205.49	-	1,161.06	1,001.54
10		36		10,987.87	6.34	9,481.65	-	1,499.87	1,256.12
11		37		11,646.20	13.22	9,766.10	-	1,866.88	1,517.94
12		38		12,343.84	20.50	10,059.09	-	2,264.25	1,787.42
13		39		13,082.90	41.47	10,360.86	-	2,680.58	2,054.44
14	43	40	Married	13,981.15	-	-	-	13,981.15	10,403.29
15	44	41		14,818.07	-	-	-	14,818.07	10,704.89
16	45	42		15,704.79	-	-	-	15,704.79	11,015.03
17	46	43		16,644.09	-	-	-	16,644.09	11,333.81
18	47	44		17,639.01	-	-	-	17,639.01	11,661.46

Before a woman gets married, she is responsible for herself to pay the income tax and personal expenditures

Example Number 2: Present Value of Net Future Income

The wife's income, tax and expenditure for herself when she is still unmarried are calculated using the methods and formula as discussed above for married Malay man age 25.

When the woman gets married at age 40, we assume the couple chooses combined income tax assessment. The husband also is responsible towards his family's expenditure and their children's education cost.

Therefore, the present value of net future income for the woman can be calculated by making projections of her total income from current age until retirement, as well as her personal income tax and expenditure when she is still single.

To calculate the surplus or deficit at age $y+t$ as in column R in figure A4-6, we use the following formula.

$$\text{Surplus or deficit at age } y+t = I_{w(y+t)} - T_{y+t} - E_{y+t} - OE_{y+t}$$

$$\text{Where, } t = 0,1,2,3,\dots,y+t \leq (e_y^o)_w$$

Finally, the present value for each year is then calculated and summed up from the person's current age until the surviving wife expected age of death.

Therefore, the present value of a human life, $(HLV)_y$ is,

$$\begin{aligned} &= (\text{Surplus or deficit})_{y+0} V^0 + (\text{Surplus or deficit})_{y+1} V^1 + \dots + (\text{Surplus or deficit})_{y+(e_y^o)_w} V^{(e_y^o)} \\ &= \sum_y^{(e_y^o)_w} (\text{Surplus or deficit})_{y+t} V^t \end{aligned}$$

$$\text{Where, } t = 0,1,2,3,\dots,x+t \leq (e_y^o)_w$$

In this example, the monetary value of a human life for the unmarried Chinese woman age 30, $(HLV)_{30}$ is,

$$= \sum_{y=30}^{45} (\text{Surplus or deficit})_{y+t} V^t, \text{ where, } t = 0,1,2,3,\dots,x+t \leq 45 = \text{RM}422,465.27$$

Example Number 2: Life Insurance Needs in a Multiple of Income

Now, we can proceed to estimate the life insurance required for an unmarried Chinese woman at age 30, in times of current income by the following formula.

$$\begin{aligned}(\text{Life Insurance required in times of current income})_{30} &= \frac{(HLV)_{30}}{12 * 2,500} \\ &= \frac{422,465.27}{12 * 2,500} \\ &= 14.08 \approx \underline{14}\end{aligned}$$

Therefore, life insurance required for an unmarried Chinese woman age 30 with current salary of RM2,500 is 14 times her annual income. The life insurance amount of RM420,000 is required to protect her income if she dies today.

Table A3-1: Present Value of Net Future Flow for Married Malay Man Age 25 with Monthly Income of RM1,000

Husband's Age	Wife's Age	Life-Cycle	(+) Husband's Income	(+) Wife's Income	(-) Analysis of Tax	(-) Analysis of Expenses	(-) Other Expenses	Surplus/ Deficit	Present Value
25	20	First child born	11,467.76	-	-	6,435.07	-	5,032.69	5,032.69
26	21		12,131.75	-	-	6,628.12	-	5,503.63	5,343.33
27	22	Second child born	12,834.97	2,556.31	35.98	7,148.70	-	8,206.59	7,735.50
28	23		14,856.10	2,709.31	115.08	7,363.16	-	10,087.17	9,231.19
29	24		15,718.82	2,871.38	152.99	7,584.06	-	10,853.16	9,642.89
30	25		16,632.29	3,467.40	208.59	13,665.09	-	6,226.01	5,370.61
31	26	Third child born	18,461.36	3,668.20	255.91	15,320.68	-	6,552.97	5,488.01
32	27		19,534.03	3,881.10	303.91	15,780.30	-	7,330.91	5,960.70
33	28		20,667.76	4,492.57	368.71	16,253.71	-	8,537.92	6,739.91
34	29		22,565.25	4,753.75	447.49	16,741.33	-	10,130.19	7,763.94
35	30		25,291.73	4,442.66	522.65	18,770.66	-	10,441.07	7,769.14
36	31		26,751.85	4,931.46	686.30	19,333.78	-	11,663.23	8,425.77
37	32		28,292.89	5,218.26	840.28	19,913.80	-	12,757.08	8,947.56
38	33		29,918.79	5,521.34	1,003.50	20,511.21	-	13,925.43	9,482.54
39	34		31,633.36	6,028.31	1,191.51	21,126.55	-	15,343.62	10,143.94
40	35		34,142.40	5,972.09	1,395.10	26,818.59	-	11,900.80	7,638.67
41	36		36,084.90	6,316.48	1,663.26	27,623.15	-	13,114.97	8,172.82
42	37		38,127.95	6,679.81	2,050.10	28,451.84	-	14,305.82	8,655.26
43	38		40,274.58	7,063.04	2,460.15	29,305.40	-	15,572.07	9,146.95
44	39	First child enters university	42,527.55	7,466.90	2,582.79	30,184.56	53,475.06	- 36,247.96	- 20,671.71
45	40		44,890.34	7,967.13	3,053.99	25,578.22	-	24,225.26	13,412.94
46	41	Second child enters university	48,359.53	8,419.32	3,375.40	43,909.28	56,731.69	- 47,237.52	- 25,392.50
47	42	First child leaves home	51,002.24	8,894.66	4,718.91	41,815.51	-	13,362.49	6,973.78
48	43		53,763.95	9,393.74	5,535.36	43,069.97	-	14,552.36	7,373.56
49	44	Second child leaves home	56,646.11	9,917.14	7,012.20	42,930.42	-	16,620.64	8,176.25
50	45	Third child enters university	59,648.59	10,365.72	7,498.54	39,102.31	63,852.02	- 40,438.55	- 19,313.68
51	46		62,771.66	11,163.45	8,790.48	40,275.38	-	24,869.25	11,531.74
52	47		67,398.55	11,769.48	10,483.57	41,483.64	-	27,200.83	12,245.51
53	48	Third child leaves home	70,823.80	12,402.31	12,656.97	31,128.35	-	39,440.78	17,238.65
54	49		74,363.01	13,061.78	14,146.70	32,062.20	-	41,215.88	17,489.81
55	50		78,010.54	11,236.26	15,009.01	30,040.58	-	44,197.21	18,208.66
56	51		83,480.37	11,818.98	17,398.28	30,941.79	-	46,959.28	18,783.11
57	52		87,418.53	12,683.64	19,459.32	31,870.05	-	48,772.80	18,940.28
58	53		93,384.35	13,320.60	22,197.08	32,826.15	-	51,681.72	19,485.36
59	54		97,620.35	13,977.67	24,459.01	48,349.64	-	38,789.37	14,198.65
60	55	Husband's retirement age	1,371,995.54	10,619.17	46.28	48,718.04	-	1,333,850.39	474,028.28
61	56	Wife's retirement age	-	259,860.52	-	50,179.58	-	209,680.94	72,346.72
62	57		-	-	-	51,684.97	-	- 51,684.97	- 17,313.58
63	58		-	-	-	53,235.52	-	- 53,235.52	- 17,313.58
64	59		-	-	-	54,832.58	-	- 54,832.58	- 17,313.58
65	60		-	-	-	50,565.87	-	- 50,565.87	- 15,501.31
66	61		-	-	-	52,082.85	-	- 52,082.85	- 15,501.31
67	62		-	-	-	53,645.34	-	- 53,645.34	- 15,501.31
68	63		-	-	-	55,254.70	-	- 55,254.70	- 15,501.31

Table A3-1: Present Value of Net Future Flow for Married Malay Man Age 25 with Monthly Income of RM1,000 (cont.)

Husband's Age	Wife's Age	Life-Cycle	(+) Husband's Income	(+) Wife's Income	(-) Analysis of Tax	(-) Analysis of Expenses	(-) Other Expenses	Surplus/ Deficit	Present Value
69	64		-	-	-	56,912.34	-	- 56,912.34	- 15,501.31
70	65		-	-	-	58,619.71	-	- 58,619.71	- 15,501.31
71	66	Husband dies	-	-	-	30,640.31	19,475.22	- 50,115.53	- 12,866.49
	67		-	-	-	31,559.52	-	- 31,559.52	- 7,866.49
	68		-	-	-	32,506.31	-	- 32,506.31	- 7,866.49
	69		-	-	-	33,481.50	-	- 33,481.50	- 7,866.49
	70		-	-	-	34,485.94	-	- 34,485.94	- 7,866.49
	71		-	-	-	35,520.52	-	- 35,520.52	- 7,866.49
	72		-	-	-	36,586.13	-	- 36,586.13	- 7,866.49
	73		-	-	-	37,683.72	-	- 37,683.72	- 7,866.49
	74		-	-	-	38,814.23	-	- 38,814.23	- 7,866.49
	75	Wife dies	-	-	-	39,978.66	25,410.74	- 65,389.40	- 12,866.49
									578,133.34

Table A3-2: Life Insurance Needs for Married Malay Man Age 25 with Monthly Income of RM1,000

Husband's Age	Wife's Age	Life-Cycle	(+) Husband's Income	(+) Wife's Income	(-) Analysis of Tax	(-) Analysis of Expenses	(-) Other Expenses	Surplus/ Deficit	Present Value
25	20	First child born	-	-	-	4,484.98	-	- 4,484.98	- 4,484.98
26	21		-	-	-	4,619.53	-	- 4,619.53	- 4,484.98
27	22	Second child born	-	2,556.31	-	5,055.71	-	- 2,499.40	- 2,355.92
28	23		-	2,709.31	-	5,207.38	-	- 2,498.07	- 2,286.09
29	24		-	2,871.38	-	5,363.60	-	- 2,492.22	- 2,214.30
30	25		-	3,467.40	-	6,010.73	-	- 2,543.33	- 2,193.90
31	26	Third child born	-	3,668.20	-	9,831.90	-	- 6,163.70	- 5,162.00
32	27		-	3,881.10	-	10,126.86	-	- 6,245.76	- 5,078.37
33	28		-	4,492.57	-	10,430.67	-	- 5,938.10	- 4,687.59
34	29		-	4,753.75	-	10,743.59	-	- 5,989.84	- 4,590.71
35	30		-	4,442.66	-	15,629.96	-	- 11,187.30	- 8,324.40
36	31		-	4,931.46	-	16,098.86	-	- 11,167.40	- 8,067.57
37	32		-	5,218.26	-	16,581.83	-	- 11,363.57	- 7,970.18
38	33		-	5,521.34	-	17,079.28	-	- 11,557.94	- 7,870.40
39	34		-	6,028.31	-	17,591.66	-	- 11,563.35	- 7,644.74
40	35		-	5,972.09	-	19,130.43	-	- 13,158.34	- 8,445.84
41	36		-	6,316.48	-	19,704.34	-	- 13,387.86	- 8,342.87
42	37		-	6,679.81	-	20,295.47	-	- 13,615.66	- 8,237.70
43	38		-	7,063.04	-	20,904.34	-	- 13,841.30	- 8,130.30
44	39	First child enters university	-	7,466.90	-	21,531.47	53,475.06	- 67,539.63	- 38,516.91
45	40		-	7,967.13	-	23,438.93	-	- 15,471.80	- 8,566.36
46	41	Second child enters university	-	8,419.32	-	40,236.83	56,731.69	- 88,549.20	- 47,599.56
47	42	First child leaves home	-	8,894.66	-	40,504.20	-	- 31,609.54	- 16,496.78
48	43		-	9,393.74	-	41,719.33	-	- 32,325.59	- 16,379.11
49	44	Second child leaves home	-	9,917.14	-	29,892.81	-	- 19,975.67	- 9,826.70
50	45	Third child enters university	-	10,365.72	-	37,355.34	63,852.02	- 90,841.64	- 43,386.47
51	46		-	11,163.45	-	38,476.00	-	- 27,312.55	- 12,664.69
52	47		-	11,769.48	-	39,630.28	-	- 27,860.80	- 12,542.63
53	48	Third child leaves home	-	12,402.31	-	29,179.31	-	- 16,777.00	- 7,332.84
54	49		-	13,061.78	-	30,054.69	-	- 16,992.91	- 7,210.88
55	50		-	11,236.26	-	26,646.39	-	- 15,410.13	- 6,348.77
56	51		-	11,818.98	-	27,445.78	-	- 15,626.80	- 6,250.52
57	52		-	12,683.64	-	28,269.16	-	- 15,585.52	- 6,052.43
58	53		-	13,320.60	-	29,117.23	-	- 15,796.63	- 5,955.74
59	54		-	13,977.67	7.57	42,886.77	-	- 28,916.66	- 10,584.80
60	55		-	10,619.17	2.49	38,320.64	-	- 27,703.96	- 9,845.53
61	56	Wife's retirement age	-	259,860.52	-	39,470.26	-	220,390.26	76,041.79
62	57		-	-	-	40,654.37	-	- 40,654.37	- 13,618.52
63	58		-	-	-	41,874.00	-	- 41,874.00	- 13,618.52
64	59		-	-	-	43,130.22	-	- 43,130.22	- 13,618.52
65	60		-	-	-	32,063.38	-	- 32,063.38	- 9,829.25
66	61		-	-	-	33,025.28	-	- 33,025.28	- 9,829.25
67	62		-	-	-	34,016.04	-	- 34,016.04	- 9,829.25
68	63		-	-	-	35,036.52	-	- 35,036.52	- 9,829.25
69	64		-	-	-	36,087.61	-	- 36,087.61	- 9,829.25

Table A3-2: Life Insurance Needs for Married Malay Man Age 25 with Monthly Income of RM1,000 (cont.)

Husband's Age	Wife's Age	Life-Cycle	(+) Husband's Income	(+) Wife's Income	(-) Analysis of Tax	(-) Analysis of Expenses	(-) Other Expenses	Surplus/ Deficit	Present Value
70	65		-	-	-	29,747.88	-	- 29,747.88	- 7,866.49
71	66	Husband dies	-	-	-	30,640.31	-	- 30,640.31	- 7,866.49
	67		-	-	-	31,559.52	-	- 31,559.52	- 7,866.49
	68		-	-	-	32,506.31	-	- 32,506.31	- 7,866.49
	69		-	-	-	33,481.50	-	- 33,481.50	- 7,866.49
	70		-	-	-	34,485.94	-	- 34,485.94	- 7,866.49
	71		-	-	-	35,520.52	-	- 35,520.52	- 7,866.49
	72		-	-	-	36,586.13	-	- 36,586.13	- 7,866.49
	73		-	-	-	37,683.72	-	- 37,683.72	- 7,866.49
	74		-	-	-	38,814.23	-	- 38,814.23	- 7,866.49
	75	Wife dies	-	-	-	39,978.66	25,410.74	- 65,389.40	- 12,866.49
									- 481,624.94

Insurance required 481,624.94 - EPF savings of 7,340.97 = 474,283.97

Multiple of income 39

Table A3-3: Life Insurance Needs for Unmarried Chinese Woman Age 30 with Monthly Income of RM2,500

Husband's Age	Wife's Age	Life-Cycle	(+) Wife's Income	(-) Analysis of Tax	(-) Analysis of Expenses	Surplus/ Deficit	Present Value	Husband's Age
	30	Current age	7,673.51	-	5,163.36	-	2,510.15	2,510.15
	31		8,510.35	-	5,318.26	-	3,192.09	3,099.11
	32		9,021.40	-	5,477.81	-	3,543.60	3,340.18
	33		9,563.06	-	5,642.14	-	3,920.92	3,588.20
	34		10,442.98	-	8,717.11	-	1,725.87	1,533.41
	35		10,366.55	-	9,205.49	-	1,161.06	1,001.54
	36		10,987.87	6.34	9,481.65	-	1,499.87	1,256.12
	37		11,646.20	13.22	9,766.10	-	1,866.88	1,517.94
	38		12,343.84	20.50	10,059.09	-	2,264.25	1,787.42
	39		13,082.90	41.47	10,360.86	-	2,680.58	2,054.44
43	40	Married	13,981.15	-	-	-	13,981.15	10,403.29
44	41		14,818.07	-	-	-	14,818.07	10,704.89
45	42		15,704.79	-	-	-	15,704.79	11,015.03
46	43		16,644.09	-	-	-	16,644.09	11,333.81
47	44		17,639.01	-	-	-	17,639.01	11,661.46
48	45		18,514.45	-	-	-	18,514.45	11,883.72
49	46		20,008.10	-	-	-	20,008.10	12,468.39
50	47		21,201.37	-	-	-	21,201.37	12,827.18
51	48		22,465.33	-	-	-	22,465.33	13,196.01
52	49		25,220.31	-	-	-	25,220.31	14,382.79
53	50		20,612.69	-	-	-	20,612.69	11,412.75
54	51		21,839.13	-	-	-	21,839.13	11,739.61
55	52		25,000.49	-	-	-	25,000.49	13,047.57
56	53		26,485.37	-	-	-	26,485.37	13,419.92
57	54		28,057.24	-	-	-	28,057.24	13,802.30
58	55		20,328.24	-	-	-	20,328.24	9,708.88
59	56	Wife's retirement age	448,073.17	-	-	-	448,073.17	207,769.17
60	57	Husband's retirement age	-	-	-	-	-	-
61	58		-	-	-	-	-	-
62	59		-	-	-	-	-	-
63	60		-	-	-	-	-	-
64	61		-	-	-	-	-	-
65	62		-	-	-	-	-	-
66	63		-	-	-	-	-	-
67	64		-	-	-	-	-	-
68	65		-	-	-	-	-	-
69	66		-	-	-	-	-	-
70	67		-	-	-	-	-	-
71	68	Husband dies	-	-	-	-	-	-
	69		-	-	-	-	-	-
	70		-	-	-	-	-	-
	71		-	-	-	-	-	-
	72		-	-	-	-	-	-
	73		-	-	-	-	-	-
	74		-	-	-	-	-	-
	75	Wife dies	-	-	-	-	-	-
								422,465.27

Insurance required

422,465.27

Multiple of income

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